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CRYING.

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I. INTRODUCTION.

Statement of the problem. Crying, far more than its opposite, laughing, is a neglected problem of psychology. This peculiar complex of characteristic movement and feeling, which has

such a prominent place in the emotional life at all ages, is very rich in its suggestiveness as a psychological problem. Besides the light which an explanation of crying may throw upon a general theory of the emotions, there arise special questions in regard to its development and to the nature of the particular associations which it involves between the mental state and the physical expression.

Standing as it does at an end of the emotional scale as the expression of extreme displeasure, its sharp contrast with laughing—expressive of the higher states of pleasure—is significant, especially when the extreme psychological similarity of the two phenomena is taken into account. The question may be raised at the outset whether we are not here dealing with fundamental modes of expression which are the basis of pleasure and displeasure in their most general form. The cry, as expression, is closely related to language development—a phase of the subject in which ethnological questions cannot be avoided.

In its extreme forms, crying presents problems which, though properly coming within the province of the alienist are also psychological, and which, when solved, will be helpful in the interpretation of normal emotion. The hygienic aspect of the crying state is important both in itself and for conclusions of more general pedagogical application that may come from its discussion.

Sources of material. The data upon which the present study of crying is based consist in part of 200 returns (161 females and 39 males) from a special questionnaire sent out by President G. Stanley Hall. The questionnaire is as follows :

1. As a child did you ever cry till you almost lost consciousness or things seemed to change about you? Describe a cry with utter abandon. Did it bring a sense of utter despair? Describe as fully as you can such an experience in yourself, your subjective feelings, how it grew, what caused and increased it, its physical symptoms, and all its after effects. What is wanted is a picture of a genuine and unforced fit or crisis of pure misery.

2. Describe such a fit of crying, either of an individual case or a composite photograph of it in other children you have seen.

3. Do you now have crying spells, with inadequate cause, at certain seasons, when you give way to tears and sobbing when alone or with others? If so, describe a typical case or two. Did you feel great easement, rest, refreshment, or relief afterward, and is occasional crying a good thing and too much repression bad?

4. Describe each symptom of a "good cry" in order. (1) Are tears first and can they be repressed? Have some a weakness for lachrymose symptoms, as for blushing? Is it sometimes a mere secretion of overloaded glands, with little psychic pain, taste of tears, and is it always the same? Do tears cease early in the spell, differ in quantity, are they more in one eye than the other, is there a difference of age, sex, personality in this? (2) Describe lump in the throat and its repression, effects on respiration, on the voice, complexion and circulation.

Is there nausea? (3) Describe vocalization of the cry in old and young, individual cases. What is a sob? Describe its frequency and culmination. Is there physical pain and where; in throat, thorax, abdominal walls? Where is the seat of convulsiveness? Is sobbing the climax of the cry? (4) Where and what are the first signs of alleviation? Describe stages of recovery, symptoms of a recent cry, psychic retrospection. Are there stages or symptoms you specially like or dread?

5. Are there cry fetiches, *i. e.*, special acts, thoughts, experiences or scenes that have pre-eminent power to cause it in you? What conditions, internal and external, are most and least favorable?

6. The artificialities of crying. When and how are you impelled to cry for effect or intensifying symptoms? How far can control of crying be itself controlled by will? How does resentment modify the genuine expression of pure grief or psychalgia? Is there desire to excite pity? What are the effects of fear, or shame? Having felt the impulse to cry, can it be so entirely repressed that later, when alone, you are more impelled to vent it and yield? What symptoms can be most and what least controlled, or controlled for effect? Do you cry to people? Describe crying as a source of pleasure in power to control the feelings of others, to draw their sympathy, or cause them to regret their acts. Describe effects of the tears of parents, teachers and friends on our conduct.

7. Describe an angry cry, its phenomena, occasions, results. Describe effects of yielding to children's tears on them. Describe the child spoiled in this respect.

8. How are your crying habits modified by age as to frequency, cause, duration, provocation, symptoms, and reactions afterwards?

9. In what respect is crying good: in infants, children, adolescents, in maturity, and in what bad? Should it have a place and a cult?

10. Can you describe cases of crying in persons usually self-controlled when the final break down comes as a cumulative effect? Does such crying tend to become hysterical? Is it followed by physical prostration? Is it a cause or an effect of physical weakness?

Returns were received from the State Normal School, New Paltz, New York; State Normal School, Westfield, Mass.; School of Ethical Culture, New York City; State Normal School, Emporia, Kansas.

This material has been extensively supplemented by ethnological data secured, for the most part, through the Bureau of American Ethnology, and its reports and from the Archives of Aboriginal Knowledge. Twenty special letters and questionnaires were also sent out, some to the Ethnologists of the Smithsonian Institution, under the direction of W. H. Holmes, Chief of the Ethnological Bureau. In correspondence with missionaries, other material was obtained relating to the inhabitants of various islands of the Pacific, the Japanese, Samoans, New Zealanders and Maoris.

A copy of a letter sent to a missionary among the Maoris will indicate the nature of the ethnological material obtained:

(1) Do the Maori cry? (2) If so, what are the elements composing the phenomenon so far as they are apparent—tears, sobs, vocalization, changes of complexion, attitudes, movements, contortions of the face,

etc., if any? (3) What are the leading occasions or provocations—fear, shame, anger, pain, grief, etc.? (4) Intensity, duration, after-effects, physical and mental; *e. g.*, does he remain depressed or soon recover and become hilarious or cheerful? (5) Difference in age or sex?

The subject as it is to be presented is divided into three parts. —Part I contains data and partial interpretation of more general aspects of the subject, the classification of crying states, crying among primitive peoples, influence of age, cumulative development, physical causes and symptoms, and description of the mental states in crying.

Part II makes an analysis of the crying act as a series of physical events, such as circulatory symptoms, attitudes of the body, vocalization, lump in the throat, sob, tears, and the physical effects.

Part III is a general résumé of the present theories of crying, physiological and biological data, development of theory, and general summary of the subject.

GENERAL ASPECTS OF CRYING.

Classification of Crying States. Whatever further analysis may show to be the common or essential elements in the crying state, a cursory survey of the emotional field, over which it extends, reveals the fact that we are dealing with a phenomenon that is widespread and probably exceedingly complex.

In answer to the question what are the special acts, thoughts, experiences or scenes, internal or external conditions that have a pre-eminent power to cause crying, 307 occasions were mentioned. These causes and situations fall into forty-seven groups.

In these groups, all the emotions that are mentioned in Ribot's classification are represented, as are also all of the occasions of emotions noted in President G. Stanley Hall's studies of fear, anger and pity, and even the depressive reactions to darkness.

Doubtless such refinement of classification of causes of crying could be extended still further. Burton in his *Anatomy of Melancholy* finds over seventy different causes of mental depression.

The range of feelings, therefore, over which the crying state extends is so great that it is an open question whether there is any limit to this act within the field of the emotions.

The returns indicate three types of crying situation sufficiently marked for preliminary classification. Besides the typical cry of grief or sadness, two other main forms stand out clearly: (I) A more or less deliberate, largely vocal, cry, best represented in the crying of anger and less perfectly by the

crying in fear and in pain: (II) The cry in joy, including such forms as cries of gratitude, of tender emotion, of feelings of admiration and for the sublime.

Between these type forms all conceivable mixtures and shades occur. In the first group, typical forms of the grief are occasioned by homesickness, remorse, bereavement and melancholy or the "blues." The following cases from the returns will serve as illustrative examples of this class:

F., 22. Grief at sale of the old homestead; "I wept for hours until too weak to care for meals or companions.—Then I dropped into a troubled sleep and for days I was ill."

F., 20. "When ten the teacher cried when reproving me, which brought on an overwhelming fit of crying on my part."

F., 22, "blues." "Often when I am alone I feel, all of a sudden, as if I were alone in the world. Such an awful sense of homesickness comes over me at such times that I usually cry until the fountain of tears seems to dry up."

F.— Grief at death of brother. Long spells of crying; "felt utterly forsaken and alone, and desired to have no one near me."

These will serve to show the grief types, and the characteristic phraseology and tone of the replies.

The following illustrate the more sthenic cry, typical of pain, anger and fear.

F. Child with toothache. Tears were profuse; screamed, violent motion, loss of self control.

Anger: F., 19. "The cry did not make me feel better, only more angry."

M., 22. "When six or seven punished unjustly; howled, pulled my hair, wished to die to punish my parents."

Joy and Pleasure: F., 20. Returning home after two years; cried from joy. The spell of crying was of short duration and was not depressing in its effects.

F., — An unexpected pleasure trip caused the tears to flow.

F., *Æsthetic emotion.* The sea seen for the first time brought tears.

Though the above described classes seem typical, there are many intermediate forms. It will be necessary to examine more minutely the crying state with reference to discovering whether if complex situations are analyzed and allowance made for accidental causes, such as the spreading of nervous energy, all the crying states may not be found to contain a common element, or at least may not be reduced to a few fundamental situations.

Crying among Primitive Peoples. Weeping appears to be a universal characteristic. Even the Indian brave, who according to popular tradition never weeps, sheds tears freely on occasion of the loss of a member of his family. His stoical attitude is limited to physical pain and his relation to his enemy.

Grinnel says:

"Indians at home and when acting naturally, freely express their emotions. They laugh and chatter and make jokes and cry, shedding

actual tears, sometimes with the appearance of great grief, anger or self pity: sometimes with no apparent reason. . . . Mourning for the dead is usually accompanied by the shedding of tears."

Mr. James Mooney writes :

"Indian children cry as long and loud as other children on occasion. They probably do not cry as often, as they are under less restraint both as to discipline and clothing.

"The Indian man seldom cries except under stress of great emotion or on certain ceremonial mourning occasions, but I have frequently seen unrestrained weeping of men on occasion of the death of a child—in one case a perfect outburst of uncontrollable grief of an old man on his daughter's death; and I have several times seen a man weep while embracing a long absent friend after meeting; also I have twice seen a father break down while pleading for a son in trouble. A very slight reminder of bereavement by death often starts a woman to weeping aloud, lamenting long after the actual loss. I have known this to happen from the sight of a picture, the hearing of a favorite song of the dead person, or the meeting of a close friend of the lost one. All this is spontaneous.

"There is also the regular death wail, which is more or less ceremonial, except to the nearest relatives, and which occurs immediately after a death, and at intervals for a long period thereafter. With the Kiowas and other Plains tribes every near neighbor, man or woman, tries to join in the first funeral lament, even to the extent of forced tears. The regular death wail is a long-drawn heart-breaking cry, repeated over and over with a loud voice, gradually sinking into silence, the wildest and most pitiful cry imaginable.

"I believe the Indian in general is less excitable than the civilized white man or less impressionable, but gives way readily to grief of bereavement. I have even known a father to starve himself upon his child's grave. My observations relate chiefly to the Plains and the Cherokees."

The historical and legendary accounts of crying are very numerous. The following are examples: "Tears of the mother god figure in the folk lore of many lands. The *vervian* or *verbena* was known as the tears of Isis as well as the tears of Juno—a name given also to an East Indian grass (*cox lacrima*)." (4a, p. 119).

"Oriental legend relates that, in his utter loneliness after the expulsion from Paradise, Adam shed such an abundance of tears that all beasts and birds satisfied their thirst therewith." (4a, p. 120). In the Iliad we read of Achilles "To the shore of the old sea he betook himself alone and cast forth upon the purple sea his wet eyes." (Bk. I: 352.) Andromache wept forth her affection. (Bk. VI: 440.) Numerous references to weeping are given in the Bible. "Jesus wept" at the grave of Lazarus. (John 11: 35.) King David wept over the death of Absalom and lamented. "O, my son, would I had died for thee." (II Sam. 18: 33.) "Abraham came to mourn for Sara and to weep for her" at her death. (Gen. 23: 2.) As Naomi urged her daughter-in-law to return home to Moab while she continued to Canaan, "they lifted up their voice and wept." (Ruth 1: 9.)

Crying caused by anger seems also to be widespread among primitive peoples. Historical references to it are frequent. Among the Samoans, the causes of crying that are mentioned are grief, pain, anger and fear. "The Samoan woman cries principally from anger." A reference to the Maoris says, "I have heard women cry when their husbands have beaten them and when they have quarrelled very excitedly." Of the Haida and the Tlinget brave J. R. Swanton writes :

"When a man has suffered a loss through purely natural agencies or through agencies that he supposes to be supernatural, he often seems to be thrown into utter confusion and gives way to the most childish fit of weeping. Not infrequently, however, he will follow this up with an act of vengeance against the animal or object . . . which he believes to contain an anthropomorphic being which has been injuring him."

Weeping for joy and because of gratitude, admiration, and the tender emotion seems to be mentioned quite as frequently in literature as the cry from grief or anger. "In the Kalevala we read how after the wonderful harping of Wainanpinen, the great Finnish hero, which enchanted beasts, birds and even fishes was over, the musician shed tears of gratitude and these trickling down his body and through his many garments were transmuted into pearls of the sea." (4a, p. 119.) Upon meeting Benjamin, Joseph said "God be gracious unto thee, my son, and he sought where to weep." (Genesis 43: 29-31.) Crying for joy seems to be very common among the negroes. Dr. W. E. B. DuBois writes: "In the religious meetings it takes the place of the old-time shouting." "The Maori woman cries upon meeting her friend." The Sandwich Islanders "cry when they meet their friends as well as when they part."

Some scattered references to racial differences in weeping indicate that the racial variations are partly due to custom and, in part, to other causes: but upon this point there is not enough evidence to show anything conclusively. Among civilized races there are wide differences. Darwin says that the English shed tears much less freely than the people on the continent. Teachers who have Italian children in their classes report that they cry easily; similarly, Mr. Wesley R. Long speaks from a wide acquaintance with the literature of the Latin races, of the abundant references there to weeping and tears.

Influence of age. In 108 of the 126 answers relating to the frequency of the cry in old and young, it is said to diminish with age. The following excerpts and epitomes from the returns will illustrate this point.

Adult. "Have not cried for a long time, eight or ten years."

F., 18. "Have seldom cried since I was thirteen, except when I was sick or nervous."

F., 19. Seldom since six years old.

F., 27. Has crying spells no longer.

Among the eighteen possible exceptions to this statement in regard to the decrease of crying with age, seven refer to the period of adolescence.

F., 21. A chronic crier, but crying was more frequent between twelve and fourteen.

F., 26. Cried most at about thirteen, when growing fast and was very nervous.

F., 18. The worst crying fit was at fifteen. "I seldom cry now, but did two years ago."

Five remark that crying is most frequent at the extremes of life. There are some exceptional cases, for example, a lady, who cries less now, at thirty years, than at twenty-six, but more than earlier in life, though the crying now is less violent. Another at twenty-eight says that crying increases as she grows older, but that the spells do not last so long. All of the returns indicate that crying diminishes with age, with no specially marked rhythms except possibly at adolescence, when there is an increased tendency to crying. A closer investigation of these points might bring out finer and more significant age differences. Differences in the character of the cry with age is probably of more importance.

There is much evidence pointing to significant differences in the character and the causes of the cry as age advances. The motives of sympathy, remorse, bereavement, and pity are apparently largely absent in the young child, but increasingly frequent in later life.

The causes of the earlier cries are largely ego-centric, and sensuous in nature. "The child often cries from pain, and for sympathy;" in maturity the leading motives are grief and trouble, and the infant cries because of bodily need and especially from anger—which is essentially the child cry." "The anger cry comes earlier, than the grief cry." Fear is a leading motive in the child cry. "The cry of the infant or child is largely for the purpose of obtaining something." "The cry of the adult is a cry of grief or of sympathy." These conclusions are repeated in many returns, and expressed in various ways, but leading unmistakably to the conviction that there is a radical change in the character of the cry as age advances. Only eight of the anger cries out of a total of 122 are experiences of adults or adolescents. The cries from fear all belong to the period of childhood, and it is everywhere understood that the cry from pain is tabooed in savagery and civilization alike. The monographs on child study are also in agreement with our returns, while Perez specifically notes that "sympathy is a later development," and cites examples of children in whom it is wanting at four and five years of age (32, p. 79).

Some special evidence bearing upon the age development in regard to the injured social feelings as a cry motive is offered by the work of Lillian A. Russling (unpublished manuscript, on which there is a note in the *Ped. Sem.*, Dec., 1905, 12 : 525), on the attitude, between eight and thirteen years, towards clothing. She shows that the majority of cases, in instances of loss or mutilation of clothing, are expressions of sorrow rather than of anger ; that shame is the most prominent element in the complex state of depression here represented and that it increases distinctly with age.

Many reasons are assigned for the decreasing frequency and changed character of the cry with age, a state of affairs that possibly needs more explanation than appears on the surface. The following points seem to stand out. The feelings and desires which have been baffled change or vanish. As age increases the discovery is made that the new desires cannot attain their satisfaction by the early method. Society disapproves of the cry ; the desire for approval leads to the abandonment of crying, which as a method of obtaining results comes to be ineffective and is, at the same time, a confession of impotency not in keeping with growing self-respect as the following excerpts indicate.

M., 25. "I realized as I became older that crying was useless."

—"The older I become the less I cry or care to. No doubt this is due to the recognition of the foolishness of crying. You begin to realize that the world cannot be obtained by crying."

Twenty-three replies have to do with the effect of shame in limiting the cry. Shame at being seen crying comes in to arrest its course and to fortify the effort at self-control. Seclusion is more often sought, while distinctions begin to be formed between shameful and legitimate cries ; physical pain must be born without crying, while the sympathetic expression of grief is undiminished. One says "I cry less because I am accustomed to disappointment." The discipline of society brings about an increased power of control. The cry advances from the instinctive form to the form of social control that characterizes all emotional development. Thirty-two speak of the raised threshold of crying as age advances ; remarking that the cause must be "more serious," "more adequate," "more real." Six state that in their own cases the result is an achievement not of lessened desire or feeling, but due to increased power of control and mastery over the life of feeling. The development of verbal language as an alternative method of expression helps also to diminish the cry. The generic form of demand or complaint that is expressed in the cry breaks up into special expression, linguistic and other. A growing acquaintance with the order in the world sets a limit to desire and expecta-

tion ; there is power to forecast the remoter significance of the situation ; the intelligence comes in to devise means of attaining ends.

Among the Indians it appears that the cry from pain is inhibited at an earlier period than among civilized peoples. We are told that in crying "an Indian boy is not unlike a white child, except that as a rule the Indian boy does not cry for pain, being ashamed to show that he is hurt."

The influence of age is seen also in the great frequency of the causeless cry at adolescence. The adolescent often cries for insignificant causes, or for no cause at all. Some imagined slight or even an imagined situation is quite sufficient to induce crying. The condition of luxury of grief or adolescent melancholy which usually contains a large element of pleasure, is frequently mentioned.

Twenty-seven say that the duration of the crying spell is shortened as age increases. Eleven have had the opposite experience. One observes no change with age, and another places the shortest cries at both extremes of life.

A woman of twenty-five says—"I cry less frequently than when young from similar causes ; require more provocation and recover more rapidly."

On the other hand, a girl of eighteen writes—"With years the crying spells become harder and longer ; in childhood tears were provoked at slight occasions but seldom lasted long. The child cry is in the nature of sunshiny showers."

By way of summary of the evidence in regard to the effect of age upon crying, it can be said that both the quantity and the quality of the cry change with age. The causes and conditions of its onset are different and it bears a different relation to the instinctive life as time goes on.

The early cry is predominantly one of pain, fear, anger, and hunger. Add to this the demand for sympathy and the list of causes is practically exhausted.

The question that arises with an attempt to compress the complex facts of age effect upon the cry into the limits of a simple, interpretation is whether in the development of the crying consciousness we are dealing merely with the moulding of a simple native reaction under the influence of social selection and adaptation, or, whether the complexity of the changes in the crying habit is due to the fact that there is more than a single cry motive ; whether, in a word, the expansive cry of the infant, sensuous in character, with its ego-centric foundation, and objective reference—its essentially linguistic nature—is the same in its origin, considered physiologically, biologically, and psychologically as the characteristic cry of the adult, sympathetic in character, seclusive, objectively caused and profoundly depressive and passive.

Only by a closer examination of both the mental state before and during the cry, and the nature of the physiological conditions which favor it can we hope to get any light upon this point.

The cumulative development of the cry. One of the most characteristic traits of the cry is its appearance as a crisis, the result of an accumulation of tension continued over a longer or shorter period. This development of feeling may go on after the actual crying has begun, or, on the other hand, the beginning of the cry may be the feeling crisis.

The following are illustrative:

M., 16. Must go to school; managed to keep the tears back until school was called; reflects upon the good time he might have had. "It seemed that tears long pent up now burst forth like water down a valley after a heavy rain."

F., 18. Case of personal injury, or slight; "Sad, dejected feeling that increased until I had to run away and cry."

F., 19. "When I began I knew just what I was crying about, but the more I cried the more I wanted to cry, until at last I forgot the original cause."

F., 19. "When a cry is restrained for a long time, I have noticed that in itself it is harder and more prolonged."

F., 22. Child—"begins rather quietly, but increases in vehemence and intensity. After he has fairly begun he never stops until he has cried to a climax."

F. "Have felt like crying but was restrained by circumstances; I waited under increased mental depression, till I came to a proper place, and then I gave way to my feelings."

F., 20. "I woke up in the morning with a load on my mind. . . . I dressed and went to breakfast. . . . After breakfast I could hold back the tears no longer, and went off by myself and gave way to my feelings. It grew in that I allowed myself to give way."

— "The lump grew larger and larger until the first convulsive sob."

Twenty-nine out of thirty-one who answered the question as to whether the sob is the climax of the crying give an affirmative answer. Eighteen of the answers out of twenty-four in regard to the nature and effect of the breakdown in persons that are usually very self-controlled indicate clearly the severity of the crisis; hysteria, or physical exhaustion is frequently mentioned. This last mentioned fact shows a development of the feeling of which the cry is a partial expression. It voices the common observation that those who feel most are less demonstrative; and that feeling in those temperaments which do not allow it to spend itself in expression remains like a quiescent volcano.

Occasionally the development of the feeling appears to be rhythmical as is shown by the following excerpts from cases:

F. Child: "The crying stopped jerkily; she would cease crying for a moment, then begin again; then stop for a longer period; then another spell of crying, and so on until she finally stopped."

F. At first but few tears fell; then they rolled down her cheeks and her body shook with sobs. She would become quiet, but soon sob as before.

M. Self pity: feels himself a martyr: "so I cried again more violently than before. Tears came profusely but somewhat intermittently, swelling to great profusion as my mind turned to some new grievance."

F. Child: grief at loss of a pet dog. "She cried for two hours, and it was necessary to give her medicine to quiet her; it was only after frequent spells of crying and calm that her grief finally subsided.—Tears came in quick bursts and short gushes."

All the cases in which a cumulative development is described are cries of grief or sadness; no angry cries are so described; nor those from fear, and physical pain; the peculiar cries of childhood.

These facts indicate clearly that crying is a profound disturbance of the nervous system, that it breaks in upon a more even balance of the feelings and physiological processes as a crisis. Often the prodromal stage of this crisis, the period of accumulation, is very marked, as though the nervous mechanism was gathering force with difficulty for some act of extreme momentum. It is possible that by comparing the state of mind that prevails through the course of this phenomenon with the more general aspects of the physiological condition that accompanies it, together with the immediate and more remote physical and mental effects, some insight may be obtained into the nature of the body preparation, if it be such, which the crying act seems to involve.

Physical causes and symptoms. The relation of the bodily condition to crying is an important topic and there is much material, of great variety, in the papers that bears upon the point. A state of nervous tension that precedes the cry is frequently mentioned; reference is made to the surcharged condition of the nerves, the "nervous, touchy feeling, before going into a good cry." The increase of mental tension that precedes the cry is not accompanied by an increase of physical or motor excitement, but rather the reverse. There is an exhaustion of the nervous system, and a decreasing power of restraint. The actual outbreak comes in the nature of a sudden discharge, sometimes, on the feeling side, following the slowly accumulating tension from a single event or stimulus, sometimes as a result of a summation of causes, as in the following:

F., 21. When wrought up to a high nervous pitch, was reproved by her father for the first time since she was grown up; the result an hysterical crying spell.

Another says: "The final breakdown comes after the last straw is laid on; it comes with a storm."

F., 23. "I now have crying spells occasionally; repressed for a long time until some little thing done or said by a friend will appear to be

an enormous offence, and will start me crying; attempt at restraint is of no avail until I am entirely tired out."

Among the special causes that are said to have a pre-eminent power to cause the cry the word "tired" occurred more frequently than any other: (twenty times); "pain," nineteen times; "sick," sixteen; "nervous," fifteen. In the descriptions of the cries from "inadequate causes," nearly one-fourth appear to be the result of abnormal physical conditions, half of which were designated as nervous. The person was "tired," "nervous," "worn out from worry," overwork or overstudy. The person perhaps very seldom cries except when worn out. Under these conditions the most trivial circumstance will bring on the cry; sometimes the outburst occurs even when there is no strong mental antecedent. Such crying is especially likely to take on an hysterical character. This is variously expressed. One says "Often when I am tired I have cried over things that when I am well, I will laugh at. I have cried, for example, when I have lost my point in an argument. Before the tears would cease I would usually burst out with laughter at my foolishness."

In all of the expressions used to describe a physiological cause for the cry, it seems that it is nervous exhaustion rather than muscular fatigue that is always mentioned, a condition of lowered mental tone from overwork, or similar cause. In answer to the question whether physical weakness is the cause or the result of the final breakdown in people who are usually self-controlled it is quite as often spoken of as the cause as the result. "It is usually the effect of nervous weakness that causes one to lose control." Ill health is the basis of most of the exceptions to the rule that crying diminishes with years. In descriptions of the prodromal symptoms of the cry, weakness of the knees was mentioned and assigned as the reason for the tendency to take a prostrate attitude, evidently due to a physical weakness. The relations of the nervous weakness to the cry, is also shown in the accounts of temporary and permanent melancholia in medical literature. In many of the returns the sense of the difficulty of tasks, when one is fatigued, that seems to be especially provocative of the cry is emphasized; such expressions occur as "it seemed like a mountain," "the molehill had become a mountain." Other prodromal symptoms of the cry mentioned, are pain in the back, and back of the head.

Cowles in his account of neurasthenia describes as a persistent symptom a condition that appears temporarily in the preliminary stage of the cry, and more or less throughout its course, namely, a helpless state or a feeling of incapacity. The state of neurasthenia he defines as a morbid condition of the nervous

system, the underlying characteristics being weakness or inability, with languor and mental depression. The mental depression is caused by the condition of depleted nervous energy, from a sense of lack of the power to meet the conditions of life. The depression from incapacity leads to doubt and distrust of one self, anxiety and hopelessness. The anatomical basis of neurasthenia is deficient oxygenation of the central nervous system; fatigue, in its last analysis, is a deficiency of this substance in the cell. This condition is brought about by a tardy circulation and insufficient oxygenation in the lungs, or is due to sluggish circulation that fails to carry away the waste products, which consume the oxygen by entering into combination with it, at the same time poisoning the cell itself, or weakening its power to assimilate and to resist excitement.

This loss of power to resist disturbing forces means that small occasions have an unduly large effect when judged by normal standards as in the psychoses of our causeless nervous cries and our irritable people. (6 a, and b.)

Kraepelin gives a picture of a similar condition in an account of a patient with melancholia in whom there is no other symptom than a depressive and apprehensive state of mind. "The whole condition is one of permanent apprehensive depression with the same accompaniments as are found in the mental agitation of the sane, viz., a loss of sleep and appetite, and a failure of nutrition. (23.)

Richardson says of melancholy which is explained in the same physiological language, "among gestures expressing misery the most prominent and characteristic is that of weeping . . . when not fully expressed the eyes in the melancholy patient are commonly full of tears." (37.)

Certain other physical conditions clearly of a pathological kind, but not so typically nervous exhaustion, are accompanied by excessive weeping, such as some forms of acute mania, and often in hemiplegia, and in degeneration of the brain as in senile dementia. Weeping, according to Darwin, is common to insanity in general and even to the idiotic, except the cretins, even when complete fatuity is reached. (7, pp. 155-156.)

If Kraepelin is right in tracing all mental disease in which there is no mechanical lesion to nervous fatigue, and if Ribot is right in contending that pain in all its aspects, both physical and mental, is the sign of disintegration and imperfect metabolism and progressive death, then our conception of crying as a recognition of impotency is supported abundantly.

Darwin is working on this basis in showing how quickly the fatiguing effects of physical pain, fear, and the shock of sorrow are manifested. Of the last he says, "as soon as the person is fully conscious that nothing can be done, as when the mother

has lost her child, despair or deep suffering takes the place of frantic grief. The sufferer sits motionless or gently rocks to and fro, circulation becomes languid, respiration ceases. All this reacts upon the brain and prostration soon follows with collapsed muscles and dull eyes." (7, pp. 79-80.) In other words, the physical attitude tends to perpetuate the physical condition, upon which the mental state depends, and when these become fixed the mood also persists in the downward progress through insanity to death.

These facts are quite sufficient to show that in the crying state the element of exhaustion or nervous inadequacy is often very prominent. The cry in many cases supervenes at the end of a period of depleted nervous strength or lowered nervous tone. Nervous exhaustion was of every degree from the effects of some minor physical disturbance which resulted in the lessening of vigor of the physiological processes, to the clearly pathological case as it occurs in melancholia, and neurasthenia.

Introspective Description of the Crying State. The typical state of mind that accompanies the act of crying appears to be despair. This is shown by the remarkable frequency of the expression of some equivalent of a desire not to live; the feeling of being helpless, hopeless, forsaken, of having no desires, is very common. This suggests at once a relationship of the crying state to such conditions as occur in the surrender stages of religious experience.

Examples follow:

F., 18. "I felt that no one loved me, or cared for me in any way; I felt that even God himself had forsaken me."

F., 21. "I felt discouraged; what is the use of trying any more. I had but one wish, and that was thwarted. Did n't care whether I lived or died and rather preferred death."

A feeling of injustice and a corresponding resentment towards life as a whole is often expressed in the language in which these mental states are described. Persecution and self-pity come in strongly.

— "I wanted to die. I wanted to get out of this cruel world. Hoped to get sick to make my parents feel sorry."

"Wished to be sick but not to die, for then I should not be able to see those suffer who had made me suffer."

The state of mind that accompanies the cry is extremely autosuggestive, the stream of consciousness, when it is not clogged, is likely to take the form of imaginative inference, to an almost paranoic degree. The subject imagines unfortunate situations and disasters that have little relation to reality and these in turn add to the depression, if they do not serve to distract the attention.

Seclusion is usually sought when the crying begins; this ten-

gency seems to be a more deeply seated impulse than the mere desire to escape the taunts, comments, or sympathy of friends. There is a strong realization of the desperateness of the situation for the moment, to the extent that sympathy is oppressive; the crier desires to be alone; it is apparently only in the cries of the infant and the young child that the cry is toward some one, and then the state of consciousness seems often to be a divided one, divided between the call for assistance or permission to break up the cramp of the will, and a desire to be let alone.

In a word the state of mind in crying as typified in the cry of grief is one of hopelessness; there is a cessation of the will to live; the hopelessness becomes active to the extent of filling the consciousness, sometimes to the exclusion of the cause and the situation to which the cry immediately refers, the mind goes on to dramatize death and total renunciation of effort. There is no call for help as in the child cry, but a realization of the hopelessness of help and a sense that the internal forces are inadequate to rouse the will from its paralyzed state. In all of the forms of crying there is probably an element of sadness. When a girl cries because she is "beaten in an argument," or when a man cries when he is about to go into a fight, there is presumably an element of apprehension and discouragement. The state of unmixed anger is not a tearful nor a hopeless state of mind. If we follow the angry, tearless cry of the infant to the period when the vocalization is inhibited by social disapproval, this is distinctly seen. The man who shoots his rival in love or business is not in a crying frame of mind; neither is the Malay who runs amuck killing every one he meets until he is himself destroyed. Hatred, envy, sullen rage, do not take on this form of expression. The dagger, tooth and claw are not symbols of crying. Anger can be defined as a pleasure in inflicting pain. Biologically we have in anger a condition of action in which vision cannot well be blinded by tears. Even in hatred, jealousy, and envy, which are called passive forms of anger, the keenest vision and the highest degree of sense alertness are demanded; with it a soberness of mind typically expressed in generalship and financial competition. So too in the war *cry* of the savage, the conditions of the crying state are absent; the word "cry" here is employed in a derived sense. The feeling here is not one merely of anger, but expresses an idea of social action quite the opposite of the true crying state. In other ways the word cry has come to be attached to states that are related only symbolically to the crying state. In the "cry" of the auctioneer and the street pedlar, the metaphorical and symbolic meaning of the word and its remote connection with the idea of appeal is clearly seen.

In the cry from fear there is the element of helplessness and sorrow as we see well in the derived and mixed fear states such as apprehension and dread where there is the element of depression and diminished vital and motor action. The same is true of physical pain.

In the cry of joy, there is a mixed emotion, attended with intellectual elements. Those states in which laughter and crying alternate are similar in nature, as when one is severely tickled or tantalized. The cry from joy, as when the girl meets her parents after a long absence, contains the element of hopelessness through association with other elements, and the mind goes back to the time before it was emancipated from the strain of the, for the time, irremediable loss. Possibly the sense of the loss is heightened by contrast with the present relief. In the moment of any great success the memory of the severity of the struggle toward the end is probably present to supply the needed mental element to construct a crying situation. In the cries of joy there is a sense of being helpless, conditioned, or carried away by the force of a power that is beyond the control of the individual and heedless possibly of our safety or pleasure. This is especially evident when overcome by a sense of the sublime. The alternations of feeling help to raise the tension and nervous excitation. Where in this alternation the joyful element preponderates we have the laughing cry instead of the crying laugh. The two conditions are identical, and the physiological result at any moment is due to the dominance of the one or other of the states of pleasure or displeasure. In both, the previous conditions are similar, namely, a strained, serious, anxious state of mind.

Crying, if our analysis is correct, is essentially a condition that, though varying much in form and expression, is one in the sense that it always contains the common element of sadness, helplessness, or hopelessness. The cry is the physical accompaniment of a mental state which is a recognition of an inability to remove certain painful or oppressive conditions; the cry appears when the feeling has reached a certain intensity. We must remember that pain, if we accept the present verdict, is connected physically with a state of disintegration whether this be in the form of temporary painful state or the fixed conditions of melancholia and other mental abnormalities. It seems likely that all painful states of mind, when the intensity is great enough express normally, themselves in crying. The cry is a physical sign, writ large, of the insufficiency of the organism and primarily an appeal for help from without; in its most primitive form, a recognition that destructive forces are dominating and that the fighting chance has gone. The will to live has ceased and the whole organism is in a dying state.

The child's cry is largely an appeal to outside sources and is best described as a state of helplessness. In a deep stage of grief, better shown in the adult, the helplessness becomes hopelessness, the individual gives up the struggle to adjust himself to the demands that are made upon him. This cry is characterized by quietness of expression and seclusion, and a prone attitude of the body, suggesting the abandonment of life, which is common among many gregarious animals when they are overcome by disease or weakness and are destroyed by their kind, and the custom among nomadic savages, according to which the old and injured are disposed of, or voluntarily leave the horde and go away to die. Thus does the sorrowing human in modern life suggest the state of mind in which, to be burdened beyond the power of self to throw off the incumbrance, is to be worthless and socially unfit to live. The many suicides in grief, which are but a positive expression of the state that essentially exists in all mourning, illustrate the nature of the crying condition. The holding of the breath so common in the cry of anger is possibly rather an instinctive than a voluntary expression of the widespread cessation or inhibition of the vital processes that occurs in this state.

Co-ordinate with the deeper seated physiological stagnation in the condition of sadness that we have called a dying state, a dying state of mind is shown in the surrender of the processes of mental adjustment, quite in keeping with the slowed circulation and weakened condition that occurs in all stages of genuine depression, whether normal or abnormal.

We are now in a position in regard to the facts of crying to construct a partial summary. Crying appears to be a reaction that occurs in connection with many apparently diverse states, such as anger, grief and joy, and a provisional classification has been made into these three classes. Each of the forms proved to be widespread, and, so far as could be determined, universal among the races of mankind. Certain age differences affecting the cry came out clearly; the child's cry is more often active: it is noisy and plainly directed outward, and for the most part seems to be the result of inner needs. The child cries more often from anger, the typical adult cry is from grief; it is quieter, tends to be subjective, the victim seeks seclusion. Its occasions are more complicated. The child cry is essentially an expression of helplessness, largely in regard to bodily needs and desires: the cry of the adult is more an expression of hopelessness. There is the feeling of quite as much need, but the cry is no longer directed outward for assistance.

The cry is a profound disturbance, a large reaction, and no mere shedding of tears. It occurs as the end phenomenon of a cumulative development of feeling, a physical dualism which

is characterized by a low stage of energy, or a stagnation of activity, accompanied by a condition which requires an effort out of proportion to the power of the organism. In the typical adult cry this schism between the power and the need increases until the outbreak of the cry comes. Whatever else the cry may be, it is a cessation of the state of strained effort, in the direction of a total giving up. The state of adjusted motor co-ordinations and attention, which the individual maintains normally in all situations of life entirely ceases; it may be said that in place of a definite adjustment of nervous mechanism a state of wide diffusion quite the opposite of adjustment supervenes and movements are no longer adaptive. Both in the crying state itself and in the antecedent periods of tension and depression, the condition is one which suggests death, in the sense that it is a cessation of normal function. The will maintains the struggle after the disintegrative processes of pain are expressed in the physical inadequacy to respond to the demands of the situation. All cries can be reduced provisionally to this typical form.

The presumption is strongly in favor of the view that a reaction so uniform in its characteristics and so widespread over the human race is instinctive in its actions. Doubtless it has been preserved in the race because it breaks up a condition of strain of adjustment, which is kept up in the face of pain, to the exhaustion of the nervous energy. Pain is the first warning of the need of the organism to cease effort. Crying acts as a second but more uncontrollable interruption of the authority of the will, when, as it were, the body takes the situation to itself and prevents the further continuance of the effort. Whether this act is in any other respect than as a mere interruption, a beneficial act, remains to be seen.

It remains to study the cry as a series of definite, particular physiological and motor events, in order to discover if possible why under situations such as have been described the organism reacts with this particular, very remarkable complex. Further light may be thrown upon the question of the instinctive nature of the cry and the significance of its elements, by a study of its effects.

II. THE CRYING ACT; ANALYSIS AND EFFECTS.

In the previous chapter some conclusions were reached about the relation of the outbreak of crying to the causes and conditions under which it occurs; it now remains to examine the actual event with reference to analyzing it into its elements and to study each of these as a physiological act, with two questions in mind; first, the genesis of the particular form which the expression of grief has taken in the human race in the act

of the cry, and second, the effect of this act which has led to its widespread adoption or its preservation as a means of expression. The first chapter had to do largely with the question as to why we cry; the present chapter with the question why we cry just as we do.

We shall find that the explanations that have been suggested and the conclusions from the present data lead to a classification of the explanations of crying into two groups, the first, mechanical or physiological, the second, biological. Each covers, in a way, the questions as to the reasons for the particular events that occur in the cry and its preservation in the race, on the ground of its effectiveness. It may transpire that these views are not entirely antagonistic to each other, but represent partial truths.

The crying act, as was said above, is a complex event, a series of motor and physiological changes, that sweep over the nervous system under certain conditions. Crying is not merely a shedding of tears nor is it entirely expressed in the changes that appear externally. It is very widespread in the body, and involves obscure as well as more obvious events. But the whole process, both in its internal and external aspects, cannot be ferreted out in our present state of physiology.

Starting with the answers to the questionnaire as a basis, a provisional grouping of the changes that occur in the cry act can be made as follows :

- (1) Changes in the circulation, (2) attitude of the body,
- (3) lump in the throat, (4) vocalization, (5) sob, (6) tears.

The complexity and wide range of the cry can well be shown further by a brief statement of the common physiological information in regard to the nervous mechanism that is involved. The act of crying is due to action of the fifth, seventh, ninth, and tenth cranial nerves together with the superior cervical sympathetic. The secretion of tears is due to stimulation of the fifth and sympathetic, the alternate paling and flushing to the sympathetic, while the consequent general stimulation of the respiratory centre results in the sobbing and general convulsive movements of hard or continued crying. Various other nervous phenomena, such as cold hands, are due to disturbance of the sympathetic system. When the anatomical relationships of the tenth nerve are recalled, the various vague body sensations that accompany crying can readily be understood as also the profound depression that so often follows prolonged crying, for the pneumogastric is thought to have a "depressor" cardiac branch. It is certain, at any rate, that, in the lower animals, strong or prolonged stimulation of the pneumogastric stops the heart. Some of these physiological facts will be discussed more in detail later. But this will be sufficient to show the nature

of the nerve mechanism which must be taken into account in a description of crying.

Circulation. Altogether a disturbance of the circulation has been mentioned fifty-four times in the returns. Thirty-five speak of a change in the complexion; twenty-five have noticed redness of the face; three mention paleness. A black or purple color, in the case of children, is described. Others speak of the red face and cold hands; hot hands are also mentioned and the fact that people differ much in the circulation accompaniments of crying. The changes in the rapidity of the circulation also appear to differ from case to case. Ten writers express the belief that the circulation is accelerated: eight of the number seem to have inferred this from the redness of the face; but this does not necessarily follow.

The indefinite expression "increased heart beat" occurs; there are "throbs in the head." Another says more definitely that the heart has been retarded in rate but beats more violently. One other observer has recorded a retarded circulation. Other references to circulatory changes are made in describing the after-effects of the crying spell; such as bloodshot eyes, the mottled complexion, parched and distended lips, and burning eyeballs.

While these returns do not allow conclusions in regard to the exact changes that occur in the circulation, the variety and generality of the vaso-motor disturbance is clearly indicated.

Attitude of the body. In tabulating the returns for the purpose, it was clearly shown that in the cries of anger, fear and pain, there is a larger amount of body movement and facial contortion than in the grief cry. These movements in the angry cry are very diffuse. In the one hundred and twenty-two descriptions of the angry cry, forty-four references were made to the throwing of the limbs, kicking or striking in an aggressive manner or bumping the head upon the floor. One writes that in the angry cry there is not a feeling of weakness or despair, but a feeling of strength or desire to fight. In pain there is a writhing of the body and throwing of the limbs. With these movements goes the suspension of the breath and resultant black or purple discoloration of the face, a condition limited to the cry of pain and anger.

In the cry of sorrow, on the other hand, there is the attitude of lassitude, especially preceding the spell. One speaks of a feeling of weakness during the cry; another of such exhaustion that she "can't stand up." Feeling of "weakness in the chest," "utter weakness, especially in the knees," are mentioned, also a tendency to the prone position of the body as characteristic of the cry of sadness. The prone position was mentioned forty times and the "erect" but once. The fact that

lying down increases the tendency to cry, and negatively that "one gets over the crying spell more quickly if one remains standing," is brought out in the returns. It was noticeable, also, that the vocalization disappears in this form of the cry. Even in the child the vocalization is subdued in pitch and becomes the plaintive moan or wail in the sadness cry. The influence of the prostrate position of the body in quieting a child is mentioned and the fact that one cannot indulge in the abandoned cry while in a standing position.

The historical and ethnological material is full of reference to the bodily attitude in the cry. To give a full account of this topic would necessitate describing mourning ceremonies among various peoples. Of these there is a great variety. The grief expressions and ceremonies as described in the Bible illustrate the manner in which, to the common elements of movement and attitude which express grief, various ritualistic elements are added, and the manner in which grief becomes formulated and conventionalized. We read of the "virgin girded in sackcloth and ashes for the husband of her youth." (Joel 1: 8.) Ahab in penitential mourning "rent his clothes and put sackcloth upon his flesh," like a man sorrowing for the dead. (I Kings 21:27.) In a wall painting of an Egyptian tomb a funeral procession is represented with the master of ceremonies "followed by eight women and four men, . . . all making gestures of mourning, by beating their breasts and their mouths while wailing, or by throwing dust on the head." (16.) To tear the hair and the beard (Ezra 9:3); to put sackcloth and torn garments upon the body (II Samuel 3:31); to sit among the ashes (Job 2:8); to sprinkle earth or dust or ashes upon the head (II Sam. 13:19) were actions in which sorrow and grief more or less naturally or conventionally expressed themselves. . . . To go "bowed down heavily" (Ps. 25:14); to go barefoot and bareheaded and to cover the lips (Ezek. 24:16, 17; Mic. 3:7) were less demonstrative tokens of mourning. Mutilation of nose, brow, ears, is mentioned by Herodotus (4:17) as being practiced by the Scythians in token of mourning for a departed king. Such mutilations were forbidden by the law of Moses. (Lev. 19:28; Deut. 14:1), although we read of making bald the head and cutting off the beard (Isa. 15:2) and even laceration of the body as a sign of vexation and grief among the Israelites. Among the Arabs it was customary for the women both to scratch the face until the blood ran and to cut off the hair (16).

The following refers to the Kiowa Indians: "The men also have their hair cut off at the shoulders, and had discarded their usual ornaments and finery. On one occasion while driving near a camp we were attracted by a low wail, and going to look

for the cause of it we saw sitting in the tall grass near the roadside a bereaved father, stripped to the breech cloth, his hair cropped close to his head and blood dripping from gashes that covered his naked body. He did not look up nor turn his head as the wagon passed, but continued the low wail with his eyes cast upon the ground." (29.)

An ancient custom among some North American tribes was of a woman, on occasion of the burial of her husband, to cut off a portion of a finger (one or more joints) and have it suspended in a tree above his body. (49, pp. 109-110.)

The great mass of this testimony goes to show that the expression of sorrow, as developed into rites and ceremonies, is made on the basis of self-torture and abasement. The positions that are assumed are those of resignation, abasement, humiliation and neglect or active abuse of the body. These motions of withdrawal and prostration are in keeping with the natural expression of grief as it appears in a civilized child and adult in the prone position; the rite is a voluntary attempt to carry further an instinctive reaction. In a professional mourner the expression of grief has become conventionalized and he performs for all, the acts of self abasement which are the essence of the rite.

Vocalization. In childhood, before vocal language has been developed, the vocal cry is essentially an instrument of expression. This is well brought out in the returns and confirms the facts already conceded by students of language. The specific cries of hunger and pain were noted and the fear cry and the cry of anger or "spunk" are also mentioned. The child "tells" when he is hungry, cold, or in pain by his cry. (7, p. 91.) It is recognized that in the vocalized cry of the infant he is calling attention, and that the cry of the older person is for the purpose of giving "vent" to the feelings, and that as one gets older the vocalization is "suppressed."

More specially to describe the vocalization in the old and in the young, such words as "shrill," "a howl" are used in characterizing the cry of the infant and the young child. Compared with the adult's it is more "vehement," "louder" and "higher." The cry of the child is thought by some to be intentional, while that of the adult is repressed. In describing the vocalization in the cry of "old and young," such words are used as "harsh," "scream-like," "emphatic," "shrill," "a wail," "sharper," "louder," "more prominent, but with less of feeling," are used with reference to the latter. On the other hand, the absence of vocalization is frequently mentioned with reference to the old, and when it is mentioned it is usually spoken of as subdued, quiet, of a lower pitch, suggesting a state of feeling of greater depth. It is "muffled," "faint,"

"restrained," "a gurgle," "moan," a "sniffle," "weak, but with more tears," "more subdued," "more quiet," "less loud," "more feeble but more heart-rending," "more heavy, and deep because controlled," "consists of sobs and gasps only."

The voice is mentioned in but seven of the actual descriptions of the adult cry and in the replies to other questions. In one of these it is said that the vocalization is produced by the attempt to speak, in two others it is characterized as harsh. That, however, in the adult the vocalization tends to return when the grief is extreme, is suggested by the returns. The restraint that is exerted upon the adult cry by the presence of others is mentioned, and the fact that when grief is extreme, this is overridden and the cry takes on more of the infantile character.

Coinciding with the unmistakable fact that vocalization is more pronounced in the cry of the infant and young child, is the evidence of a similar distinction between the cry of the savage and the cry of the more civilized races. For example it is said of the Esquimaux about Behring Strait, that "when a person dies during the day, his relatives amid loud wailing, proceed at once to dress him in the best cloth they possess," etc. (46, p. 272.) Of the Sia, a tribe in New Mexico, we read: "The immediate relatives in consanguinity and clan, are present during the bathing of the body, and make the air hideous with their lamentations" (43). Of the Sioux, it is said that after the death of the warrior, the widow cuts her hair, mutilates her body with a sharp flint, and meanwhile "keeps up a crying and wailing." "After depositing the body . . . they continue exhibiting their grief, squaws by hacking their arms and legs with flint . . . the men would sharpen sticks and run them through the skin of their arms and legs, both men and women keeping up the crying generally for the remainder of the day, and the near relatives of the deceased for several days thereafter. . . . Similar mourning was kept up at the death of women and children. It is not unusual, at the present time, to hear a man or woman cry and exclaim, 'Oh, my poor wife, or child,' as the case may be, and upon enquiry to learn that the death happened several years before." (49, pp. 109-110.) The males of the Heda and Tlinget tribes were said to have "childish fits of crying." The cry of the Samoan women was spoken of as "very noisy;" and by another writer the crying of both sexes of the Samoans was described as "natural and childish." The word childish was also applied to the crying of the Hawaiians. Of the Yo-Kai-A Indian it is said "The chief of the visiting tribe made a brief speech in which he no doubt referred to the death of the chief of the Yo-Kai-A, and offered the sympathy of the

tribe in their loss. As he spoke some of the women scarcely refrained from crying out. I presume that he proposed a few moments of mourning, for when he stopped the whole assemblage burst forth in a bitter wailing. Some screamed as if in agony. The whole thing created such a din that I was compelled to stop my ears. The air was rent and pierced with their cries."

Free vocalization in the cry is abundantly attested in the Bible as having been practiced among the Hebrews. This is noticeable even in the cry of joy, for "Jacob kissed Rachel and lifted up his voice and wept" (Gen. 29:11). When Esau heard the words of his father, that Jacob had secured the blessing originally meant for him, "he cried with a great and exceeding bitter cry" (Gen. 27:34). On seeing the self-sacrifice of his brother Judah in offering to sacrifice himself for his brother Benjamin, Joseph was touched, "could not refrain himself before all that stood by him . . . and he wept aloud." (Gen. 45:1, 2.)

Other evidence suggests that as the cry becomes formal and ceremonial the depth of the feeling may not be in very close relationship to the intensity of the expression, that it is the deeper feeling that is naturally related to quiet crying and tears, that naturally the expression is vocal only when the tears are insufficient as a safety valve to the emotion. This loud wailing of the savage is probably often unaccompanied by tears, as in the case of the Kanaka, of whom it is said that "he cries to the utmost extent of human endurance, although tears do not flow so freely as the grief and sobs would indicate." Another writer describes the crying of these, as loud and easily repeated on slight occasions. "Between the arrivals of the friends of the dead, those already present indulge in laughter, and feasting. The grief at the public funeral of the Maoris was described as only partly real. It was marked by a long mourning wail which was "all over as if by magic; after which they indulged at once in feast and laughter." The Samoan's grief is "soon forgotten." (From missionary returns.) Of the Yo-Kai-A, Stephen Powers said, "at a given signal they ceased weeping, wiped their eyes, and quieted down. Then preparations were made for the dance" (49, p. 193). These and other facts indicate that among savages the crying act is largely built upon by custom and ceremonial. Crying becomes a profession in the mourner. The "louder" they can cry the "more expert" they are regarded, as among the Hawaiians.

Some differences in the vocal cry of races have been carefully described by Mantegazza. Among the Niam-Niam it is "Ow, ow" to "okoun, okoun," in intense suffering; among the Bongos, "aoh," the Dyor "awai, awai," the Papuans of

New Guinea, "ac," the peoples of New Hanover "se, se" (27, p. 259). The Samoans, according to our returns, cry "aue, aue." The quality of the intonation has also been mentioned in the ethnological returns. The close relation of the cry to musical expression is also indicated. The dirge of the professional mourners among the Hawaiians, is said to have a most touching character, and "to follow the scale as accurately as our musician does his song." Among the negroes the vocalization of the cry takes the form of the funeral moan or chant. Among the Indians tears are attended with a song recounting the good qualities of the deceased.

The data in regard to vocalization in the cry indicates the essential oneness of the crying state. The natural expression of the crying state is the vocal cry, which is a call in a state of helplessness. This primitive fact becomes modified in many directions, and, like all useful expressions of emotion, is highly developed. In the adult cry of grief we find the vocal cry suppressed, but that it is a suppression is indicated by the fact that it occurs again when the state of feeling is intense. The savage as an adult not only freely expresses the mental state of grief by vocalization, but makes use of it as a ceremonial, and voluntarily increases it just as the child does when he cries voluntarily for attention or sympathy, but for quite other purposes. In the "hopeless" stage of the adult cry, the cry is no longer for help and our customs place a ban upon loud expression of grief. Observation leads to a conviction that there is considerable difference in this respect in the expression of grief in the higher and lower classes in our own communities.

The lump in the throat. The lump in the throat has been so commonly referred to in the returns as the first symptom of the coming cry, that the fact must have some significance though the returns are not sufficient to establish the point beyond suspicion. In answer to the questions in regard to the nature of the lump in the throat as felt, its repression, its effects upon the voice, respiration, complexion, and circulation, the following characteristic phrases were used:

"It comes just before the cry; cannot swallow;" "pain or ache in the throat;" "feels like swallowing the larynx;" "increases with the attempt to swallow, unless the mouth is opened and the face is straightened into its natural position;" "it may be suppressed."

The effect of the lump upon the respiration is indicated in such expressions as "makes it difficult to breathe," "almost choked." "It will move neither up nor down." "The throat feels full." "The breathing is hard and strained." Twenty-two of the thirty-six answers relating to the respiration declare that the breathing is made more difficult. In addition to these,

there are seventeen references to the loss of breath in the crying spells of childhood. Thirteen of these refer to the cry of anger, and four to fear.

Forty-eight have noticed a disturbance of the voice, while only one declares that there was no such disturbance. One says, "It feels as though something came up into the throat and stopped the respiration and the vocal organs, a kind of catch in the throat, making breathing difficult and speech almost impossible." Another writer says, "A hollow aching lump seems to rise in the throat until in the back part of the mouth; this quickens and shortens respiration and causes the voice to be weak and broken." It "cracks the voice," "hinders respiration," and sometimes "entirely cuts off the voice." The words, "guttural," "husky," "harsh," "choking," have been used to describe the nature of the disturbance of the throat. Four have noticed the increase in the lump in the throat when the effort is made to suppress the tears. Others say: "The tears relieve the lump;" "must cry to get rid of the lump." "The lump is more noticeable if one is with people and tries to suppress the tears—" One gives an explanation, "The feeling is caused by the tightening of the muscles of the throat to prevent the convulsion in the breath, that naturally takes place when one cries." The progressive development of the lump, and its relation to the sob, has also been observed. "It grew larger and larger until the first convulsive sob: then it seemed to stop." With another the lump continues throughout the cry. Four are unacquainted with the "lump" sensation; one thinks that it is not always present; another "has not felt it since childhood."

The data in regard to this interesting symptom of the cry are insufficient to warrant a physiological interpretation of it. That it is connected with disturbance of breathing and vocalization appears certain. On the other hand it is connected with movements of swallowing, and the relation of it to disturbances of the mechanism of the digestive tract is indicated.

The Sob. In answer to the question "What is the sob?" the following definitions were given: "a convulsive catching of the breath," "a convulsive choked drawing of the breath," "a natural tendency to hold the breath in extreme grief;" "one makes little gasps for air; these are the sobs;" "a convulsive sigh;" "a sob is a short, quick sound, which indicates the cessation from prolonged weeping." "It occurs at the end of the spell and lasts for some time." Other definitions are "a convulsive contraction of the diaphragm," "a convulsive drawing of the breath," "a sharp drawing of the breath," "a choking sound made in the throat, accompanied by a convulsive movement of the shoulders, or of the whole body, coming at regular and fre-

quent intervals;" "a short and rapid inhalation, two or three for each exhalation culminating in a fit of gagging and grimaces, and gradually diminishing in rapidity to about one in twenty-five seconds." Another records the fact that the sobbing is more rapid at first, perhaps five or six in a second.

Other remarks refer to the control of the sob. "The sob is the most difficult part of the cry to control." "Outside influence can have an effect upon the other symptoms but the sobbing continues."

The relation of the sob to the vocalization is indicated. "A deep and agonizing breath suddenly expelled and another deep breath taken." The sob is thought of in three cases as the vocalization of the cry. The expression "sobbed aloud" occurs.

The late appearance of the sob and its relation to the shedding of tears have caught the attention of the observers. "The sob continues later than the tears." "It generally follows but may accompany the tears." "It comes after the tears." "Tears give way to sobs;" "most noticeable after the tears have ceased," at the end of the cry. "I always sob for a long time after the tears have ceased." Another, speaking of the order says, "the tears cease to flow, the lump begins to disappear, the sobs slowly cease." Preyer says, "not weeping but the sob comes late."¹

The order of events in the cry of a Japanese child was especially observed by Dr. Theodate L. Smith. At the 7th week it was as follows: (1) Drawing of the mouth to a square shape (in the 12th week a protrusion of the lower lip preceded crying); (2) closing of the eyes; (3) the vocal sound â â â; (4) reddening of face; (5) tears. The crying was not accompanied by snuffling, and there was no indication of the sob as late as the 7th week, except its possible beginning in a slight catching of the breath. In the 9th week sobbing was clearly present.

The reddening of the surface that accompanies the cry was definitely observed in the 9th week. It began in the face, spread up over the top of the head, and simultaneously down toward the feet.

The early appearance of tears in this child (almost from birth and certainly within the first forty-eight hours, according to the records of physician and nurse) is exceptional.

As early as the 7th week the vocal cry was well differentiated and the cries of hunger, pain, discomfort, sleepiness and anger clearly distinguishable from each other.

Observations in regard to age differences—"In the child the sob is usually the climax; in the adult the cry often begins

¹ Some observations upon the development of the sob and other points that were received too late to incorporate can be mentioned together here.

with the sob." Another describes the typical adult cry "as sobs and gasps only;" or "only sobs, tears occurring but occasionally." These examples suggest that the sob plays a larger part in the crying of the adult and appears earlier in the crying act. The explanation is that the sob persists at a time of life when other elements of the cry have been inhibited. The sob also varies with the nature of the feeling which accompanies the cry. Ten have noticed that sobs accompany the angry cry but four have also mentioned that there is less sobbing than in the grief cry. One reports that the sob is present in the cry of joy.

The sob appears to be absent in the young infant, and its first appearance is recorded at about the time when tears also appear, not perhaps until about the end of the fifth week. The sob appears to be an entirely human manifestation of grief. Darwin records that the "monkeys scream and pant but do not sob." (7, p. 157.)

There is little explicit mention of the sob in the ethnological returns. Its absence has not been observed among savage peoples, and its presence seems occasionally implied, as in such expressions as "a perfect outburst of uncontrollable grief" in the case of a male Indian. That some, at least, of the Indian tribes sob is shown in the above (49, p. 103) referring to the Yo-Kai-A tribes of California, which says that when a visiting chief referred to the dead chief of the tribe, "with difficulty they suppressed their sobs." Among the Sandwich Islanders, the sob is said to be pronounced. The sob is probably universally, as well as distinguishingly human.

According to these definitions and descriptions the sob consists (1) of a deep and violent inspiration, opposing a tendency to choke. It seems to be due to a spasmodic contraction of the diaphragm, the choking being caused by a partial closing of the glottis, and constriction of the vocal cords. When the sobbing is most violent, the interruption may break the inspiration into a series of broken fragments and a gasping sound may attend the vibration of the vocal cords. A like spasmodic movement, though less pronounced, may attend the effort to expel the air, the air passages continuing to remain constricted. The term sob is often used as including this movement of expiration. This phase seems to be the last stage of the vocalization, the remnant of the unrestrained "a-ha-ha" of the child cry.

It is probable that the breaking of the rhythm in the respiration belongs both to the inspiratory and expiratory movements. Expiration is less under muscular control; the catch in the inspiration is partly at least an effect of broken muscular innervation; so that just to the extent that the expiration is muscular it partakes of the jerky character of the whole muscular process.

The sob appears to be a later symptom of the cry persisting after the flow of tears has ceased. In a case recently observed, the child was seen after tears had ceased; the marks were still upon the face, vocalization had also discontinued, but he was still sobbing violently with a movement much like hiccough. This appears to be typical. The late appearance or the persistence of the sob as an element of the cry is clear enough but the time of its appearance is less easily determined. The evidence is not conclusive but it is indicated that the sob appears after and relieves the lump in the throat. Yet in some cases it was observed to be present, at least, as a tension of the diaphragm, when the eyes were merely suffused with tears, and the sensation in the throat scarcely noticeable; it was then apparently simultaneous with these symptoms. It may not only persist after the tears have discontinued but it may appear in a paroxysm that involves no shedding of tears at all. The sob seems to be essentially human, though it is not necessary to the crying spell; tears may flow without it. It seems to be characteristic of the climax of the cry and is probably always present when the paroxysm is intense. It seems to be always absent in the cries of animals.

These points are still further involved by the fact that in the adult and in cases when the stimulus is intense, the crying may begin with the sob. It is quite possible that there is always in the cry a disturbance of the respiration, but that it does not always appear either to outside observation or to introspection, unless it is pronounced.

There is no certain testimony in the returns as to the location of the beginning of the convulsive movement of the cry. Twenty-five observe that the throat is prominently affected. But some other part of the body is usually also mentioned as prominently affected. The diaphragm, the chest, abdominal walls, stomach, lungs, thorax, or the abdomen as a whole are repeatedly referred to in the papers.

Some anatomical explanation for these varied phenomena is found in the wide distribution of the pneumogastric nerve, and its intimate connection with the solar plexus of the sympathetic system.

Tears. The young infant does not shed tears, and the age of first appearance in sufficient quantity to be seen upon the cheek varies from two to five months, according to different observers. According to Darwin's observations, they first appeared at 139th day (7, 153). But he quotes others who place this date at 20, 84, 110, 104 days. Preyer observed tears on the 23d day (33). Perez places this onset at between two and three months (32, p. 66), while Mrs. Moore has observed their appearance as early as the sixteenth week (30), Miss Shinn at one month (41), Lowden, at 53 days.

After their first appearance they remain throughout life connected with the typical cry; they may remain as the only visible symptom of the cry. In regard to the time of appearance of tears in the paroxysm, the returns are not conclusive; fifty-five say that they are the first symptom to appear; sixty-three say that the lump in the throat precedes.

The proportion of the entire spell over which tears continue is also not definitely determined. There appear to be individual differences. In some cases tears cease early in the spell; in others they persist. But all who mention the point maintain that the tears cease before the end of the crying as a whole. One says "about two-thirds of the whole period;" another speaks of the dry sob remaining after tears have ceased.

Running of the nose during crying is mentioned in some cases. This indicates that a portion of the tears have passed down the nasal duct instead of overflowing in the eye.

The rate of secretion of the tears appears to be another variable characteristic; in some the rate is said to be faster at the beginning of the cry; others say that tears increase as the crying continues. Excessive shedding of tears seems to be an idiosyncrasy. They appear to be much more easily stimulated in some than in others, perhaps quite independently of the amount of feeling. Instances are given by the correspondents: as, for example, a man who always sheds tears when he reads anything that is in the least pathetic. Altogether twenty-eight cases were mentioned among the returns in which there was said to be a tendency toward excessive shedding of tears. The absolute capacity of the glands is sometimes very great. Darwin tells of an idiot who cried the entire day on discovering the æsthetic blunder of having shaved his eyebrows to promote their growth. (7, pp. 155-156.) Other cases of long continued shedding of tears were mentioned in the returns. One had the eyes continually suffused with tears, so that it was necessary to repeatedly wipe them away.

Tears are but little under direct control of the will. Three-fourths of the answers to the question as to whether tears can be repressed, contained the statement that they cannot, or gave conditional answers. One says, "only for a time." Another, "only when the feeling can be conquered." "It is impossible when one is alone or when the influence of society is wanting." Similar conclusions are reached by the observers in regard to artificial crying. In this connection it was said by fifteen of sixteen observers that the tears are the hardest part to manage. One says "Unless I am really sorry, I can never shed tears." One found that, in trying to cry, she could sob, and bring the tears to the eyes but could not shed many nor get the peculiar sensations of a real cry. Others seemed to manage better and

one relates that "if the face was contorted, tears would flow and a feeling of depression would follow." Another : "I took part in a play in which I was obliged to feign crying. After a little I began to sigh and moan, and in a short time I was really crying." A well-known actor was asked how he managed to weep at will, and replied, "I call up the image of my dear father, who is dead."

It is likely that most of the instances reported are cases of manipulation of the feelings rather than direct control. All the accessory efforts are probably merely mechanisms that result in conjuring up the sad feelings.

The effort to excite tears deliberately implies their intimate relation to a depressed feeling since their effectiveness consists in exciting a sympathetic feeling in the minds of those to whom they are addressed. That "tears are woman's most effective weapon" we are continually reminded in our returns. All except two of fifty writers who have described the effect of tears of parents, teachers, and friends, upon their conduct are agreed upon the great effectiveness of tears to conquer a stubborn will or subdue passion, when everything else fails. "They caused sorrow and regret over my misdeeds." "They affect me when nothing else will." "I never saw my mother cry but once and that moved me more deeply than anything else in my life." "When my parents or friends cry over my conduct I feel ashamed of myself, and make resolves to be better in the future."

Tears, although, of course, common in both sexes, and more common in women than in men, are possibly more frequent in proportion among the males in some races than in our own. The crying of both sexes has been especially mentioned in writers about the negroes, Indians in the Heada and Tlinget tribes, the Japanese, the Samoans, the Sandwich Islanders, and the Maoris. The evidence is strongly in favor of the view that tears are more frequently shed among the lower races of mankind than among civilized peoples. A Maori chief cried like an infant because certain sailors sprinkled flour on his choice clothes (7, p. 155). Children also shed more tears than adults; it seems to be the current opinion among the correspondents that tears "last longer" in childhood, but there is no conclusive evidence. Some who have answered the question have doubtless been led astray on this point by inferring that because children "cry" more they shed more tears. Many of the cries of the young child are vocal in their nature and tears are entirely wanting. This is especially true of the angry cry. Of the angry cry it is said "the flow of tears was not very great." Of twenty-nine who have referred to the tears in the angry cry, fourteen observe that they are less frequent, and

eight declare that they are characteristically absent. In two cases of the five in which tears were mentioned in connection with the cry from fear, the tears were said to flow only after the danger was over. That the active form of the cry from fear is tearless, is suggested by the answers to the question about the inhibitory effect of fear upon the cry. Fourteen out of twenty-one say that fear inhibits the cry. One says that intense fear inhibits crying; another that if fear is not too intense, crying will result. The transition from this upper limit to the tearful level is indicated in such replies as the following: "Fear is likely to cause numbness at first, and then tears." In general the active element in the emotional state inhibits the tears though it may not have any effect in lessening the vocalization, and may increase it. In fear, for example, the more intense form is one of inhibition of both movement and the cry, then at a little lower level screaming predominates, and in the fear that is more largely representative, tears are more common and they may flow freely after the shock of the fear is passed.

Intensity of emotion, even of sadness, seems to have the effect of inhibiting the tears. Some report that they cannot cry when they feel the saddest, which evidently refers to the tears, since other elements of the cry are more under the control of the will.

The shedding of tears from grief has also been noticed among the higher animals. Darwin reports that "the Indian elephant is known sometimes to weep . . . when captured it sank to utter prostration, uttering choked cries, with tears trickling down the cheeks," and again "the female when distressed by the removal of her young one contracted the orbicular muscles when the trumpeting began." Darwin also reports that one species of monkey, the *Macacus Maurius*, is known to weep copiously. (7, p. 167.)

Effects of Crying. The following examples will show the nature of the facts with which one must deal in treating of the effects of crying:

F., "If it were not for crying I think people would go insane, not having any way to give vent to their feelings."

F., 18. "I feel as though some one had been talking kind to me and a great load had been taken from me."

F., 23. Speaking of despair, "It was always felt before the crying spell, but never after."

F., 19. "After my crying spell I am sure I felt much relieved. The nervousness was gone and I was ready to enjoy life once more."

Among the fifty-seven responses, referring to the adult period all but three express somehow the notion that the effect of crying is good.

The following refers to childhood:

F., 32, a mother. "Unless you can divert them let them cry as much as they can; as a rule they appear to be relieved after crying."

Others refer to the common belief that a baby that cries much is healthy. In seven of the forty-five references to infant cries, the cry is said to be a good means of exercise; that it strengthens the lungs and the vocal cords. The remaining answers refer to the use of crying as expression.

All except two of the twenty-one replies concerning adolescence that refer at all to the expressive significance of the cry also declare the beneficial results of crying. They say "it is good," "a relief," "acts as a safety valve."

The exceptions among these returns emphasize the fact that there is a limit of prolongation or severity beyond which the cry is not beneficial but harmful. One says that although crying relieves the feelings, too much will weaken the power of control. Another, "A limited amount is good." "It is bad for anger, good for grief." "The child should cry when in pain or grief." "The effect is good if the cause is genuine, and the crying is not too hard."

Many other expressions are used to describe the benefits of crying and its limitations.

Seventy-one of the ninety-four descriptions of the cry without objective cause also report the favorable results.

These are typical:

F., 18. "I have an uneasy feeling as though I could not sit down and do anything. After a good cry I feel greatly relieved. It seems as if a great weight had been lifted from me."

F., 21. "I always feel relieved after such a spell, and things generally look bright to me."

F.,— "I have often become so tired, discouraged, or nervous over work and worry that there seemed nothing else to do but have a good cry, and after one has cried a long time relief comes."

F. "A cry sometimes relieves one of that pent up, stuffy feeling and seems to lift a burden that has been resting upon one. Too much repression is bad for the body and the mind both; the mind will not work."

Among the answers to the question in regard to unforced fits of crying, or of "pure misery" in childhood, forty-six of the sixty-one who refer to the effects declare that these were beneficial, giving a sense of easing, refreshment, or relief.

Altogether there is abundant evidence to show that in all of the kinds of crying, except the angry cry, though the immediate physical effect is possibly bad, the mental relief is great, and this seems to be true of all periods of life.

One says, "Although I felt exhausted and sick from crying so much, nevertheless I felt relieved," "I was mentally relieved but physically tired." This state of affairs is repeatedly mentioned in the papers, with a great variety of phrasing.

The termination of the cry by sleep is frequently spoken of especially in the cries of the adult. This is quite what would be expected in the typical condition after the crying spell, physical exhaustion and mental relief. There is relief relative to the previous condition of excitement and a diminished store of nervous energy. Compared with the great distress of the mental strain and unpleasant associations, the physical exhaustion is pleasant; it is like the tired or exhausted state that ensues after a hard day's work, pleasant, if the exhaustion has not been carried too far. It is only when this limit has been passed, and we find the exhaustion greater than the relief, that the experience is predominantly unpleasant. If the physical exhaustion has been carried still further, the sense of strain and effort is not relaxed; the excitement goes on; restoration does not begin and pain is the exclusive result. When over-exertion is local merely, the result is a state in which pleasure and pain are mingled, as in the case of a physical pain such as headache combined with a strong sense of mental and physical relief.

All of these characteristics of over-exertion may occur as end phenomena of a crying spell. The predominance of the pleasant or the unpleasant effect seems to be directly related to the severity of the spell. In every instance in which ill effects were reported as the result of crying, the spell has been said to be severe. The conclusion is warranted that the crying spell in itself naturally terminates in a sense of relief, and it is only in cases in which exhaustion occurs that this effect is obscured.

That the ill effects of a prolonged crying spell may be very severe is clearly indicated in the returns. Such expressions occur as "It is a great strain upon the nervous system;" "cried myself sick;" "there was loss of appetite, great physical weakness, and unusual activity of the heart."

Among permanent or long-enduring effects of crying are mentioned: headache, stupor, sickness, exhaustion, nausea, sore eyes.

So far as the references to crying in literature are concerned, it seems that, as compared with laughter with its similar physical reactions, the good effects of crying have been late in becoming recognized. That laughter is good both physically and morally has, according to Sully, become a commonplace to the students of literature. To quote his words "The unlearned, who know nothing of diaphragms, nor of congested veins needing to be relieved, have had a shrewd conviction that laughter sets the current of life moving more briskly. Proverbs such as "laugh and grow fat" attest this common belief. — The learned Burton (b, 1577) quotes a number of physicians in favor of the ancient custom to enliven the feast with mirth

and jokes.—Mulcaster, for example (born about 1530), gave a high place to laughter among his physical or health-giving exercise" (44, pp. 34-35). Yet in none of these accounts is the beneficial effect of crying mentioned.

But apparently it is only recently that crying has come to be recommended as a means of physical development. There is now, however, considerable reference in medical literature to the effect that crying is beneficial; that it is an exercise in deep breathing, and tonal expression. Others have recorded its therapeutic uses among the insane for the purpose of relieving mental strain.

Further light upon the question of the relation of crying to emotional tone is afforded by the replies to the questionnaire that have to do with the topic of distraction.

Inquiry was made as to the favorable influence of diversion as a relief from the tension of grief versus the effect of the crying spell; whether the diverting of the attention would relieve the tension permanently or whether there was a tendency for the stress to go on beneath consciousness and break out later. There are about an equal number of affirmative and negative replies on this point. When the cry is voluntarily repressed or attention completely distracted for a time, the tension does not necessarily remain relieved. When the stimulus is intense and the current of thought and feeling too strong for diversion, the relief seems to depend upon the power to cry; if the tension continues, and the victim is carried beyond the point when the natural reaction of the cry is impossible, a state of mind ensues which, in its extreme, becomes entirely abnormal and may go on to insanity. The natural expression of grief is the cry and grief that has passed beyond that stage is essentially abnormal. An instance of the effect of crying upon the state of tension is related in Tennyson's *Princess*: (45.)

Home they brought her warrior dead;
She nor swooned nor uttered cry.
All her maidens, watching, said
'She must weep or she will die.'

Then they praised him, soft and low,
Called him worthy to be loved,
Truest friend and noblest foe;
Yet she neither spoke nor moved.

Stole a maiden from her place,
Lightly to the warrior stept
Took the face-cloth from his face;
Yet she neither moved nor wept.

Rose a nurse of ninety years,
Set his child upon her knee—
Like a summer tempest came her tears—
'Sweet my child, I live for thee.'

The maidens were wrong in supposing that the outburst could be induced by *increasing* a sense of the bereavement. The experienced nurse knew that it must be diminished. From B. W. Richardson we quote, "As a rule the free escape of tears relieves the heart, and saves the body from the shock of grief. Tears are the natural outlet of emotional tension." Yet he notes that there are exceptions to this rule and "we have more than once seen uncontrollable weeping followed by serious symptomatic disturbances and effects, principally of the heart and circulation; we have known intermittence of the heart beats to be induced in this way, and to assume the most serious character." (37.)

It is said that women who are able to find relief in tears keep their youth longer than those who repress them. Concealment "like a worm in a bud" is not only a beautiful poetic conceit but a profound physical fact. In short, strong emotion should find expression. 'Give sorrow words.'

Dr. S. Weir Mitchell says: "I am very sure that the effect of moral tears on the child or the women in distress is to give a certain amount of mysterious relief, the ultimate cause of which it is rather difficult to determine. This also is quite certain in my experience with people who have suffered great grief and do not cry at any time, that they are either unusual types or fail for want of this secretion to get relief which has been of late obvious in other cases."

As Sully says of laughter that "as a light stimulus to the nerves, it does good by its occasional irruption into a domain which would otherwise have too much drowsy monotony," but that "its benefits are rigorously circumscribed" (44 a, p. 37); so we may say that crying is a similar interruption to overcome a graver condition. The good effects of crying are relative. They are relief from pain rather than a source of exuberance, vitality, and life. After a crying spell life is more often made tolerable than enviable.

Other effects of crying are seen in the cases of people who are normally given to strong self-control. Of the twenty-four answers describing examples of crying in persons usually self-controlled, eleven say that the result is physical exhaustion and prostration. In one case, the illness lasted for a month. Crying spells that occur after long control, as during the illness of friends, are likely to be especially severe and exhausting. One report contains an account of the difference in the effect upon two sisters who had lost their mother. One broke down, at once, and could not control her grief. After the grief had expended itself she rapidly grew cheerful and liked to talk about her mother. The other sister shed no tears, but went about the necessary duties, and only after about a week did her

grief find expression. Then she broke down and was ill for several weeks. Another example almost identical in nature is reported.

In regard to such differences, it is likely that in the first case the emotional nature was relatively lighter and the expression of grief less intense. In the second a greater physical vigor withstood for a longer time the outbreak. Where there is already nervous weakness it is likely that the cry point is more readily reached; the accumulation is not so great, and the exhaustion therefore relatively less.

Summary of Part II. Both in its aspects as observed by those who have answered the questionnaire and viewed as a physiological process, crying is a very complex phenomenon. Its description and explanation is necessarily difficult. Still the cry presents itself as a somewhat uniform series of acts, though with very decided changes in form due to age and possibly other conditions.

Briefly stated the essential elements of crying are changes in circulation of a very widespread and general kind, characteristic body attitudes, lump in the throat, vocalization, sobs and tears. The attitude of body varies with the cause of the cry; the typical attitude of the grief cry is one of collapse. The attitudes of grief in ceremonials further illustrate this point and bring out the fact that crying is closely related to actions of abasement and self-torture, renunciation and even suicide.

Vocalization in the cry comes early in the series of acts and it is the first feature of the cry to attract attention in the life of the individual. There is also more vocalization among primitive races than among the civilized. It is from the "cry" as call for help, which is clearly its function in the cry of anger, fear and hunger, that language has in part, at least, developed.

The lump in the throat is a mysterious element. It appears to precede the tears in the cry and to be related closely to the beginning of the sob. Connected both with swallowing and breathing, its function seems to connect it both with the mechanisms of respiration and digestion.

The sob is, for the most part, a late symptom of the cry; it begins, though there are exceptions to this rule, later than the other symptoms and remains after they are suppressed. It is absent in the young child, and there are but few references to it in the ethnological literature. It appears to belong especially to deep grief and, typically, to adult grief. Like the lump, it is connected both with respiration and movements different from those of respiration. It usually comes as a climax to the crying spell.

Tears are absent during the first few weeks of life save in exceptional cases. They are, of all the elements of the cry, the

least under control of the will. And, although the evidence on the point is not conclusive, there appears to be more shedding of tears in the young child and among primitive peoples. The cries of anger, fear and hunger of the young child are relatively tearless; it is the grief cry that is essentially the tearful cry.

The effect of crying is declared good, both by the observers who have reported, and by medical opinion. The good effect is felt in a mental rather than a physical relief, since the physical result is commonly exhaustion. Some medical opinion supports the view that crying is a helpful stimulation in the young child and that the cry resulting from grief aids a sluggish circulation and also affords some kind of a relief from a tension or overcharged condition of the nerves.

There are two groups of symptoms or elements in the cry. The first group develops earlier and belongs more especially to the cries of hunger, pain, fear, anger; it has more vocalization and less tears. The deep inspirations and holding of the breath go with this but there appears to be very little or no sobbing. Unfortunately there is little evidence in regard to the facial movements accompanying this cry. All of this complex comprises the cry that is a call for help. It is more active than the second form. The second complex of symptoms comprises the sob, the lump in the throat, the collapsed position, the lack of vocalization and abundant tears. It is passive and goes especially with the hopeless state of mind. The two forms surely overlap in the life of the individual and the symptoms of the two become mixed. The tears and the deep inspiration, especially, appear to accompany both phases of the cry.

These two forms of the cry are not to be thought of as entirely separate but rather as representing, probably, different forms of physical reaction or expression at different moments of a situation, which is characterized by helplessness and a lack of individual adaptation to situations.

It remains now to examine the crying situation more minutely, with special reference to any theories that have been proposed, to explain the movements that occur in it. We shall find ourselves confronted with a mass of interpretation of these acts, which can best be called the physiological or mechanical. Whether the crying acts have any further significance, as coordinated or adaptive acts, can be decided only after a more exhaustive search into the origin and function of the structures that are involved in crying than has yet been made by any one.

III. THEORIES AND INTERPRATATION OF DATA.

This section consists of (I) a résumé of views in regard to crying. (II) A study of crying as a physiological act. The

elements of the process as they appear to introspection and observation are each treated under three heads (a) anatomical, including especially a description of the nervous mechanism involved; (b) embryological; the genesis of the structures in the human individual; (c) zoölogical; a study of the development of the structures in the race. With such evidence at hand the theories of crying can more intelligently be estimated. (III) the construction of an interpretation of the crying act as a whole.

(I) *The Theories.* The scattered facts and theories about crying relate for the most part to two aspects of the process. (I) its usefulness, as a large physiological reaction of some kind either to stimulate the circulatory mechanism when it is depleted by grief, to revive the metabolic process, or to relieve the overcharged nervous system. These explanations, which account for the fact that crying has survived, are thought sufficient as a theory. They include references to the good effect of crying in the young child as exercise and to the use of tears or the acts that accompany the shedding of tears. These views can be called physiological or mechanical theories of crying. The second group of suggestions relate to the development and preservation of the crying act as language, *i. e.*, a means of expression of need.

The mechanical theory of crying can be expressed as follows: When in a stage of passive grief the victim is in a state of apathy and collapse, with sluggish circulation and slow vital processes, the depressed state is relieved in one of two ways; the consoling friend is likely to interrupt and urge the sufferer to voluntary exertion and to divert the trend of thought into new channels. If the effort is effective, the fatigued cortical centres obtain rest and nutrition is increased through the improved respiration and circulation that has been brought about by the action. (7, pp. 79-80). But when the sufferer is left to himself, unpleasant trains of associations are followed up, the depressed feeling is increased by them and, in return, reacts upon them, the energy becoming lower and lower until there is an outbreak in a nerve storm of weeping. When the shock of grief is sudden we have the same series of events foreshortened. The natural tendency is to hold the breath; there is a disturbance of the heart and stagnation of the vital functions. The weakness of the knees and the prostrate attitude are signs of the bodily weakness. Now but a small stimulus is sufficient to upset the mental and nervous equilibrium already strained. In either case, in the midst of the voluntary cessation of activity and function, nature takes the case into her own hands and produces the same physiological effect to restore and to re-stimulate the action.

For an explanation of tears we are largely indebted to Darwin whose theory is briefly this. During any violent expiration, as in screaming, the external, the intra-ocular, and the retro-ocular vessels of the eye are affected in two ways (1) by an increased pressure of blood in the arteries, (2) by the return of blood being impeded. It is certain that both the arteries and the veins of the eye are more or less distended during violent expiration. Now nature has taken precaution against injury to the delicate structures of the eye: to prevent the eye becoming gorged with blood, the eyelid is spasmodically contracted and holds it tightly against the cushion of the socket thus preventing an undue expansion of the capillaries of the eyeball and those immediately surrounding it. This movement involves a raising of the inner ends of the eyebrows, which occurs simultaneously with the downward and outward movement of the corners of the mouth, that gives the typical expression of the crying face. (7, p. 147.) "Wrinkled forehead, with eyebrows drawn together, closed eyes, up-drawn nose, and open mouth" is a description of a crying child in our returns. The constant and energetic movements of the face are often seen in the cases of hypochondriacs and melancholics. (7, p. 185.)

Darwin adds that "it is an important fact to be considered in any theory of the secretion of tears, from the mind being affected, that whenever the muscles about the eye are strongly and involuntarily contracted, in order to compress the blood vessels, thus to protect the eyes, tears are secreted often in sufficient abundance to roll down the cheeks. This occurs under the most opposite emotions, and under no emotion at all—the sole exception being in the infant, who does not shed tears until from the second to the fourth month." (7, p. 163.)

The overflow theory of the expression of crying is related to the play theories of Spencer and Schiller (42, 39). This view is, that when there is a condition of highly charged nervous structure or over-nourished cells, discharge in the line of the least resistance tends to take place. Such spreading of energy is made to account for much of the action such as occurs in crying and laughing. Those writers who have been influenced by this theory have, as for example, Sully, been prone to see a very close relationship between laughing and crying. Sully gives examples in which the laugh and the cry occur in connection with the wrong stimulus, *e. g.*, a shock of unpleasant news will produce laughter and the reverse—and this is not a pathological but a very common phenomenon. The laugh that follows after a strain of dignified behavior, the nervous cry after a shock of fear or after close attention or prolonged grief, shows that the laugh is a result of a relaxation from a tense

surcharged condition of the nervous system. When the demand for tension is relaxed there is a dispersion of energy and the laugh takes place. The cry is also preceded by a state of tension; and their difference, according to this view, is largely a matter of difference in the manner in which the release takes place. In the case of the laugh there is an interruption; in the case of the cry the tension increases until resistance is overcome.

Close resemblance in the vocalization of the laugh and the cry has been pointed out, and the fact that oftentimes the two are not distinguishable by their vocal expression alone. Text-books of physiology often call attention to the resemblance of the laugh and the cry, pointing out that the chief difference is in the facial expression, and that the physiological events are very similar. Similarity is again attested by the fact that the laugh is often accompanied by a flow of tears.

Such a likeness is very well explained by the overflow theory, for the laugh and the cry are most similar at the point of greatest intensity. According to the laws of spreading of reflex action, when the stimulus is intense enough, structures are brought into play in a regular order and, at sufficient degree of intensity, the physiological expression of emotions are similar. Hence the ease of the transition from the laugh to the cry. As Sully says, "The extremes of boisterous mirth and grief seem to approach each other." Darwin explains the ease of the transition and the close similarity of the laugh and the cry, by the close similarity of the spasmodic movements." (7, p. 208.) "When the motor centres are engaged in the full swing of one mode of action they may readily pass to the other and partially similar action." (44, a, p. 70.)

It is unquestionable that there is truth in the views in regard to the overflow of nervous energy or stimulation, when action is intense. This fact serves to confuse emotional expression, and doubtless crying both as shedding of tears, and as a larger physiological reaction occurs purely as a result of mechanical stimulation, or spreading of effect of stimulation. But it is very doubtful whether this theory will explain all of the crying reaction or the essential differences and likenesses in crying and laughing.

The experiments of Dumas (8) upon the physiological accompaniments of joy and sadness, and his interpretation of them, make an important contribution to the subject of crying.

Dumas found both in joy and in sadness an active and a passive stage, quite distinct in character from each other. In grief the excited or resistant stage is one of over excitation, increased heart-beat and respiration, and vasomotor constrict-

tions leading, on account of the intense effort which it demands of the organism, to a period of fatigue or sadness. The passive stage has opposite physiological characteristics; it is a state of cessation of struggle against the situation. The two states commonly alternate.

The tears, according to Dumas, belong to the excited stage of sorrow in which there is active cardiac excitation and peripheral *vaso-dilatation* and not as Lange maintains to a period of reaction or relief from vasomotor contraction. The tears go with red face, swollen eyelids, etc., and other signs of active secretions, urine, etc., the results of circular hyperactivity and vaso-dilatation.

He agrees with Descartes in saying that extreme sadness is the sadness that yields, the less profound sadness that which resists.

This "resistant" theory of the phenomena of crying is important, and is in accord with the view developed later in this paper, in which attempt is made to interpret biologically the body activities in crying, though it must be noticed that the "resistance" in the active stage is non-adaptive, both in its mental and physical aspects, and needs more explanation than it in itself affords, of the crying situation.

Another view of crying is developed from the nature of the cry as a call or expression of a need. This is best stated by Powell. "Those naturalists who are also psychologists explain the origin of weeping in irritation in which the eyes are subjected to smoke, dust, or other foreign particles, and from scratches and blows. Primitive man seized upon this natural effect of discomfort to artificially produce weeping in order that he might express grief to others (34: CXLII). When used at first it was difficult, but it speedily became easy, and becoming easy it gradually became habitual, and finally instinctive by inheritance. Thus weeping became a linguistic sign . . . like other signs of emotion it may be used in the practice of deception. Similarly the sob has originated in the practice to simulate movements of pain and as in the case of tears, "habit has made it instinctive, but its true nature as an artificial sign is plainly exhibited when sobbing is simulated" (34: CXLI).

Inadequate as this theory is to explain the origin of crying, it serves the purpose of emphasizing the manner in which the cry has been built upon and complicated by being turned in many ways from its course. It is quite true, as Powell says, that "emotional signs are especially characterized by multifarious meanings, for this reason emotional language is highly ambiguous, and a ready tool for deception (34, c). But it is not so certain that the symbolic nature of crying is illustrated by its use in various forms of crying for effect. Crying, how-

ever, as the returns to the questionnaire show, does undergo a high development as conscious expression. Many report its use habitually as a tool of deception; it is often accompanied by imaginative dramas of self pity, etc., quite remote from its natural ideationless expression.

Chamberlain has pointed out the significance of the cry in relation to the development of language, and that language has a large root in the cry. There are two language elements, in fact, in the animal cry, (1) the spontaneous reflex cry of emotion, (2) the significance of the interjection, the cry of warning, threat or summons, and the great variety of meaning, which is possible to a single verbal symbol by a mere variation in its tone. By means of stress, reduplication, and intonation, language has been developed (4 b. pp. 118-119). Whatever the natural basis of the cry, it is still more highly conventionalized in the mourning customs of primitive and civilized peoples. Here the form of expression rather than the emotion itself is built upon, and art develops out of sorrow, diffusing the feeling and subordinating it to the consciousness of the expression. Music, too, has one of its roots in the cry, which develops through the rhythmical lamentation and the simple dirge into more complex forms.

Wundt rejects this explanation (*i. e.*, Darwin's) seeing in the lachrymal glands derivative pain assuaging organs. The secretion, which is continuous, cleanses the eye from foreign bodies, such as dust and insects, etc. As the visual images are the most important of all, the shedding of tears would be an unconscious effort to drive away sad representations, having for its foundation an analogy between the painful sensations and the images. (48.)

Ribot comments unfavorably upon this view as well as upon those of other writers. He calls attention to the fact that all attempts to account for tears are based upon their connection with painful states of consciousness. But tears are produced under conditions so varied that this is not adequate. Ribot maintains that the fundamental fact of the physiology of tears is that they are always accompanied by an increase in the circulation, but that this simplicity of mechanism is not incompatible with a diversity of causes. The circulation is accelerated in joy and tears flow as a result of the increased blood pressure. Sorrow is accompanied by a lowering of blood pressure, and in the early stages of crying there is often no shedding of tears. But in the case of sorrow the shedding of tears may well belong to a second stage in which the return of vitality has begun. Now the tears act as a "safety-valve."

That there should be so many divergent and unrelated opinions in the matter by such authorities as Wundt, Ribot, and Darwin indicates, at least, the difficulty of the subject.

Before these theories can be properly judged it is necessary to examine more closely the mechanisms of the act of crying according to the outline proposed above (p. 188).

Physiological and biological data. The lachrymal apparatus consists of the gland, the canals, sac, ducts and nasal duct. Genetically, lachrymal glands first appear in the amniota but the duct first appears in the amphibia. In its embryological development the lachrymal gland arises as a solid growth from the conjunctiva.

Of all the phenomena of crying, the tear is perhaps the most puzzling because it appears under such diverse conditions, physiological and mental. The direct control of the gland is by way of the ophthalmic branch of the fifth nerve, a branch that is also closely connected with the nose, mouth, throat, and respiratory organs. Tears can be directly produced in many ways, such as by stimulation of the conjunctiva, the nasal mucous membrane, the tongue or the anterior part of the mouth; also by powerful stimulation of the retina by light, electrical stimulus, stimulation of the cranial or upper spinal afferent nerves. Venous congestion of the blood will also cause tears. Stimulation of the upper cervical sympathetic is also said to cause a "turbid flow of tears;" but this is a point upon which all are not agreed." (9, p. 1312.)

Darwin's view, supported more or less by the common physiological facts, is that the closing of the eye, or contraction of the orbicular muscle, while causing an undue pressure upon the eye, excites the peripheral nerves, leading to the lachrymal centre. Added stimulation to this centre also occurs as a result of increased circulation of the blood. When the surface of the eye is bruised or irritated tears flow freely. Remote acts, such as coughing, sneezing, laughing, vomiting, all of which involve similar effects upon the circulation and respiration, will produce a flow of tears.

These facts all taken together indicate that no single certain explanation can be made to account for the tear. The mechanisms involved are so interrelated and physiological and mechanical factors so combined that the connection between the tear and a central cause, such as grief, cannot be surely determined. The question is still open, however, whether any mechanical cause alone is sufficient to account for the *large* flow of tears which sometimes occurs in connection with a *very slight* emotional disturbance in which the apparent stimulation of related mechanisms is small and in which there is probably no strong congestion or spreading of stimulus through overstimulation.

The facial movements receive little attention in the returns and the physiology of them can go little beyond referring them

to action of the facial nerve which is concerned in all facial expression, and the further fact that the vagus is also concerned in facial contortions.

The lump in the throat is also obscure as a physiological event. In certain analogous acts there is affection of the throat which may throw light upon the lump. In the globus hystericus the subjective event is that of a constriction of the throat or strangulation. It usually begins with a painful feeling which arises in the lower part of the abdomen, and which mounts upwards until it reaches the neck and then gives a feeling of strangulation. Peterson says that the condition which exists is a "pharyngeal spasm" (5 a). In vomiting, the throat undergoes a change very similar to that described in crying. Here the act is clearly purposive, namely to prevent food from passing backward into the trachea. The larynx rises,—the epiglottis is pulled down to close the entrance to the trachea and the soft palate rises to close the entrance into the nasal passages. The result is a temporary strangulation, respiration stops. A similar act takes place in hiccough, the epiglottis closing the entrance to the trachea.

In connection with the act of crying, attention was called to another phenomenon also referred to the throat, several report as the most important and persistent physical accompaniment of grief or slight effect of a pathetic incident, a pain or discomfort in the throat. This may occur when there is apparently no other sign recognized. Pain in the throat persisted for a year, in the case of a woman who grieved at the death of a child. The suggestion, in a case individually reported, that these are felt to be sometimes an effect of the thyroid, led to a further examination of the point.

There is considerable evidence to show that the thyroid, when enlarged in the condition of goitre, quickly shows the effect of grief and all mental excitement. One case was reported in which the goitre grew largely during any continued mental excitement. Among the chief causes of goitre are mentioned mental and emotional shocks, "especially profound and protracted anxiety and grief." (5, p. 498.)

A brief review of the anatomical facts of the thyroid may throw a little light upon the problem of crying. The organ is highly vascular, its nervous control is by way of the middle and lower ganglia of the cervical sympathetic and through the vagus. Embryologically it is developed in vertebrates as a ventral diverticulum of the mouth or from the pharyngeal epithelium. (38.)

Phylogenetically the ventral portion of the primitive pharynx was concerned in the transmission of food. The special mechanism of this was effected by what was afterward to be-

come the median element in the thyroid. It is suggested that this change of function was correlated with the increasing size of the primitive chordata, and consequently the ability to eat larger prey. The larger food would not have the tendency to escape through the gill slits, and would not need any assistance to pass into the œsophagus. (13, p. 172.) The very close but still imperfectly understood relationship between the thyroid gland and the nutritive processes of the higher animals also adds evidence to its primarily digestive function.

Another effect of crying that is to be referred to glandular changes is the increased salivation; which is, especially in children, sometimes very pronounced, partly accounting for the tendency to swallow repeatedly when crying. The salivary glands are controlled by the facial nerve and also by the sympathetics. The secretion varies with the nature of the nerve stimulation. The saliva obtained by stimulating the chorda tympani nerve is thinner and less viscid than the so-called sympathetic saliva, which is remarkable for its viscosity (9, p. 307).

The sob is a complex muscular act, a combination of a downward pressure of the diaphragm, rhythmically performed, and accompanying actions of the abdominal muscles. It differs from ordinary deep breathing, as one may determine for himself by performing the motion, in that the abdominal movement typical of the sob is in the direction of a constriction and that it is an expiratory movement. The jerkiness is accounted for by the fact that the inspiratory movement thus works against contraction in the direction of an opposition. It may be noted here that the diaphragm belongs to two physiological systems, the digestive and the respiratory, a fact which is illustrated by the part it takes in hiccoughs and in vomiting—acts which need a closer scrutiny with reference to our present topic. There is some doubt whether vomiting is due partially to the contraction of the stomach walls themselves or movements of the diaphragm and abdominal walls only. The event consists of nausea, a reflex flow of saliva and retching movements, which consist principally of spasmodic inspirations with closed glottis. The effect of these movements is to compress the stomach by the descent of the diaphragm and the contraction of the abdominal walls. It is not shown that there are any anti-peristaltic movements. The causes of vomiting are very numerous, including stimulation of the vagus of one sort and another. The afferent nerves concerned in the act are the sensory fibres of the vagus; the efferent are the vagus, the phrenic, and spinal nerves supplying the abdominal muscles. Though the common cause is stimulation of afferent nerves by the contents of the stomach, the vomiting act is very easily produced by remote reflex causes and by emotions—especially fear and grief. The

effect of grief upon the digestion may also be mentioned here. (20, p. 326.) The essential point is that vomiting is a "spasmodic contraction of expiratory abdominal muscles and inspiratory diaphragmatic muscles." (20, pp. 325-326.)

Hiccough is caused by a twitch of the diaphragm attended by a sudden closure of the glottis, and is most frequently caused by gastric irritation. It usually results from an excitement of the phrenic nerve; but it is also associated with respiratory centres, a laryngeal spasm and inspiratory movements. It attends certain forms of hysteria. While conversely nausea and hiccough are often characterized by symptoms attending globus hystericus, which is described as a painful feeling arising in the lower parts of the abdomen and developing into the sensation of a round body which mounts upwards—causing a feeling of strangulation in the throat. (5, p. 585.)

In both these acts, the mechanisms both of respiration and the digestive apparatus are brought into play. It must be remembered that the action of the stomach itself as a part of the digestive system is largely autonomous. It is an automatic organ and the stimulation comes from the contents of the stomach. The two vagi and the solar plexus are however connected with the stomach-oesophagus-movements (20, p. 312).

The close resemblance of the sob to these digestive movements cannot be overlooked. The movement of the sob and the vomiting movement are alike in every particular except the apparently accompanying movement of the stomach itself in the movement of vomiting or the internal stimulation from the contents of the stomach. The throat phenomena occur in all of these physiological acts and all are influenced by depressive emotional causes. One-third of the responses to the question whether nausea is an attendant symptom of the cry were affirmative in nature.

All of these movements are results of combinations of mechanisms that belong both to the digestive and respiratory system. The manner in which this close relation has been preserved is easily understood if one recalls the fact that the respiratory mechanism is an outgrowth of the digestive system. Embryologically the lungs develop like a gland out of the oesophagus, at least in all amniotic vertebrates (17). Physiologically the two functions are interacting, both in that they make use of the same motor mechanisms *and in other ways*. The breathing rate is affected by the glosso-pharyngeal nerve, especially in the act of swallowing (11, p. 738). Strong stimulation of the olfactory nerves and fibres of the fifth nerve distributed to the nasal chambers will cause expiration. The glosso-pharyngeal acts with the pneumogastric as the afferent nerves

of respiration. Through the pneumogastric nerve various effects become common to the two systems (20, p. 563).

Interpretation of the crying act as a whole. Do such facts as the above afford any means of interpreting the action of crying? On the one hand there is the fact that the vagus nerve controls or may control the greater part of all the actions that occur in crying. The vagus affects the salivary glands and the thyroid, exerts an influence upon the circulation and causes the globus hystericus as a pharyngeal spasm. It mediates movements and sensations of the oesophagus, movements of the stomach and organs of voice; it tightens the vocal cords, opens and closes the glottis, controls abdominal muscles, the sensations and movements of respiration and the contortions of the face. Two sets of movements, the tear act itself and the facial movements are, in part at least, mediated by other nerves, the movements of the face by the seventh, and the tears by the fifth cranial nerve; the vagus is closely connected with the facial nerve. But the whole nervous connection of these acts is so complicated that no certain interpretation can be made on the grounds of anatomical relationship alone. Even though one should maintain that the whole act of crying is a mere overflow of stimulation and entirely the result of action of the vagus nerve, it must still be asked why of all the combinations that can be affected by the vagus nerve should just this particular set of movements accompany the state of grief.

It remains to ask whether there is any functional connection between the various cry acts. The closest similarity was found between the sobbing act and the act of vomiting; this included similarity of the movements of the diaphragm, the throat phenomena, in part at least and the affection of glands, including tears. That this resemblance is more than a fortuitous one cannot be proved by anatomical evidence alone, and must, in any case, rest upon circumstantial evidence. But there is other proof that this is not a mere accidental resemblance.

If the acts of crying and laughing are considered together it will be noticed that there are here not only phenomena of a peculiar kind, but the antithesis in several important ways of the two will be evident. Obviously the crying act and the laugh accompany typically mutually exclusive and opposite states. The laugh is largely an expiratory act, the cry, that is the typical adult cry, with the sob is an inspiratory act. The muscular movements in the case of the laugh are felt to be of the lower abdominal muscles and are different in character from the sobbing movements, though both are rhythmical. The laughing movement is performed by a bracing of the diaphragm and, at the same time, a rhythmic contraction of the

walls of the abdomen so that the diaphragm is gradually forced upward. The movement of the sob, as has been said above, is a forcing downward of the diaphragm with, at the same time, an action of the upper abdominal muscles acting in an upward direction. The facial movements are also opposite. In the laugh the face is as it were pulled together; the corners of the mouth are pulled upward and the eyebrows are brought downward. In the cry the eyebrows are lifted and the mouth is pulled downward. Another well known effect of the laugh upon the lower abdominal mechanisms, namely the relaxation of the sphincters, is to be compared with the effects upon the glandular appendages that occur in crying.

The circulatory differences are not so certainly determined but, in laughter, there is an increased circulation, dilatation of blood vessels, increased muscular movement and the effect upon digestion is beneficial. The opposite conditions accompany grief.

All of these facts put together establish a strong probability of the close connection of the acts of laughing and crying with the movements that are connected with the digestive system—that laughing is the accompaniment of movements that promote digestion and that crying is a part of the process which is involved in the act of rejection of food. This hypothesis receives support from so many sources that it can scarcely be disregarded. The sobbing act itself, with its throat accompaniment similar to the acts of vomiting, the effects of glandular structure are all parts of the digestive movements of one kind or another. The apparent part played by the thyroid is also strongly corroborative of this view. Its close connection with the digestive system phylogenetically suggests that it is directly affected by nervous stimulation. If we accord any credit to the view that emotional expression often involves structures and functions that are at the present time in a state of disuse in the human, the direct effect of the thyroid both as a secretory organ and as a mechanism connected with the movement of food in the alimentary canal would be expected. The further effect of such an action upon the shedding of tears is confirmed by the connection between affections of the thyroid and disturbance of the eye seen in exophthalmic goitre.

Two views have now been exploited one of which explains the act of crying as a whole, as in itself a meaningless physiological act, and the view supported in this paper, which seeks to interpret the series of movements as a connected function. That this latter view is in keeping with the whole tendency of thinking in regard to the expression of the emotions since Darwin's time will probably be admitted by every one. The views in regard to play represented by Groos are in point as con-

trasted with the older Spencer-Schiller overflow theory, namely that play-actions are co-ordinations of an instinctive character serving ends in the life of the individual.

Many other examples of tendency in the direction of the instinct theory of emotional expression could be given, each one of which strengthens the evidence.

Now, it is necessary to take into account all of the partial conclusions that have been reached in order to see more clearly the place of the crying state among the psychological functions. The physiological events of the cry considered as call in a state of helplessness, as it is seen in the young child (the cry in which the deep inspiration and strong vocalization are the distinguishing features), soon becomes complicated with the phenomena that have been called rejection movements and which are apparently connected with the digestive system. These symptoms, belonging purely to the collapsed stage of the crying state, combine at many points with the call cry. The movements may to a certain extent antagonize each other, as when the effort to call is maintained against the collapse tendency of the nervous system. That the long inspirations of the cry are associated with the effort to cry aloud in order to obtain assistance can hardly be doubted. And there may be in the peculiar inspiratory movements certain useful acts apart from this motive, such as gaining vocal power and at the same time maintaining a firm contraction of the abdominal muscles which is necessary for preparation for strong action. The deep inspiration without this additional effort is one in which the abdominal muscles are relaxed or drawn outward. Similar actions are shown in the practice of girding the abdomen for strong muscular effort, as is sometimes done by athletes.

Thus there are two distinct elements in the physical actions of crying separate in their motive but taking place within the one psychological act followed by collapse or cessation of effort. The call cry with its deep inspiration and strongly active aspect gives way to the hopeless cry which is passive, a breakdown accompanied by body prostration, sobs, tears, lamentations, self-torture, and physiological movements of "rejection." It would be difficult to imagine a combination more clearly representing the giving up of the struggle of adjustment to environment and helplessness. The fear, hunger, and anger cry are all essentially cries for help. The adult does not, as a rule, cry for help, but he helps himself through this stage and then, at the end, breaks down, when the schism between the need and the energy becomes too wide. So that it is quite readily explained why the breakdown form of crying goes only with a high degree of nervous development. Under conditions of tense effort the nervous system repudiates the imposition that

is put upon it, breaks through the will and throws to the winds all the accumulation of adaptive machinery and hereditary precautions. The individual throws himself without restraint upon his environment. Like its opposite, laughter, then, crying is essentially non-adaptive in its character. It lacks the incisive character of the *common* instinctive reactions. It is diffused, and unco-ordinated and the movements that are most characteristic of it are not adapted to any immediate end. How shall we interpret such action on the hypothesis of the survival of the fittest among the psychophysical functions. Possibly it can be interpreted as Mosso understands fear, a flaw in the organism. Possibly its usefulness as a restorative of equilibrium in the body or to relieve the nervous tension is quite enough to assure it a place among the functions which have survived. But there is another element, that is, its social significance. The purpose of the cry as call is social; it demands and assumes the co-operation and good will of kind. The hopeless cry also stands for a condition which also calls for some form of relief. The crying act is therefore a psychosocial situation and both the call cry and the cry of despair have come to have a social significance. It is the reverse of the objective side of the act of helpfulness which lies at the bottom of social development. Therefore the ability to cry stands primarily for need, and not for any moral state of the crier. To express his need the infant and the young child are over-expressive. The cry in its effect upon the parent and nurse is an imperative demand quite out of proportion to the actual distress and out of proportion nowadays to the danger of neglect. But under stimulus of instinct the child unconsciously simulates physical pain and severe suffering. The gasp and the prostrate position of the cry of the adult are also extravagant and over-expressive. It simulates or stands for a total giving up and, in itself, in some respects, resembles the actions of dying. The modified cry of civilized man, therefore, stands for this greater event and the elicitation of sympathy, so notoriously accomplished by the mere suffusing of the eyes with tears, is symbolic of the greater need and derived from it. The deep hold that this act has upon the social sympathies is surprising when one understands how much out of proportion to need and even moral deserts it is. Another factor has, of course, assisted in the reduction of the cry and the emphasis of the tear as its symbol, namely, the tendency for all emotional expression to become centered in the face. For with the advent of clothing, the race has come more to "live in its face."

The theory of the cry that is based upon its usefulness physiologically is in the light of this interpretation inadequate ; it

reaches to very little depth. Like other actions of an instinctive character crying aims at its mark without special reference to the immediate effect upon the physiological actions of the organisms. Just as we flee in the presence of danger at the risk of our hearts and cerebral arteries, so we cry even at the expense of our nervous energy. The compensation is in the provision that is made for the removal of the particular trouble toward which the instinctive action is directed and the social aid that is commanded. In other regards the body takes a chance. The crier gets his mental relief, and doubtless the body for the most part is not especially benefited by the act.

The acts of crying are, thus, by no means a mere symbol of the act of giving up the struggle. The movements in themselves have significance and are a means towards an end. They are physiologically cessation and even reversal of the will to live and be nourished.

If the question arise as to how these particular movements may have gotten associated with the particular mental states that they accompany, the answer must be because they have never been dissociated from it. Dislike expressed in movements of rejection or withdrawal is the most primitive displeasure: when displeasure is intense it brings to light the movements that are naturally a part of it and which, it is quite possible, are present in the small in all expressions of displeasure. We have learned from recent psychologists to associate non-assimilative states and actions with states of displeasure, and these cry acts are simply these writ large.

If this argument is justified, it is evident that there is in the cry act a very primitive form of emotional expression or physical correlate of the mental event of displeasure. The peculiar non-adaptive nature and diffusive character of the body effects in crying are set apart from the ordinary emotional reactions and we can suppose that it strikes deeper into the organic life than they. In a word, crying is an expression on this interpretation of displeasure in its most generic form.

The social aspect of the cry is so clearly illustrated in the typical early grief cry of the child that its significance can hardly be missed. The child turns his back and covers his face to cry, or throws himself upon the floor, an evidence of the cessation of appeal or effort to obtain something, but social aid is thereby profoundly stimulated and the physiological acts signifying cessation of appeal have come to be more effective than the effort acts themselves.

Summary of the Psychology of Crying. Crying, though an exceedingly interesting and fundamental topic in expression of the emotions, has been a neglected problem. The present approach to it includes the interpretation of from several sources

(1) Returns from a questionnaire, (2) data from ethnological material, (3) physiological data, (4) the scattered literature upon the subject.

Crying occurs under many different mental and physical conditions, but its essential element, psychologically, proves to be a feeling of helplessness in the infant shading into a feeling of hopelessness and surrender of effort in the typical adult cry. The important conclusion is that crying in its last analysis is a situation in which a reaction has taken place at the end of a period of stress in which there has been strong effort and depleted nervous energy. It is essentially a breakdown of the nature of a cessation of adaptation to environmental conditions. An analysis of the crying act itself into its component physiological parts shows the following to be the most important traits: disturbances of the circulation, body attitudes, sobs, tears, lump in the throat and vocalization. There are clearly two groups of symptoms that accompany different moments in the crying act. The first group are the active movements of call, as represented by the vocalization of the young child. The second group, including the facial expression, the sob, the lump in the throat, the tears, prove to be closely associated with movements of the digestive apparatus, and are interpreted as "rejection" movements, going back to the primitive form of rejection of food. The theories that explain crying merely as an "overflow" of energy or as inherited habit seem inadequate. By studying the actions of laughing and crying in relation to each other, still further evidence is obtained for the "rejection" theory.

These movements are, according to this interpretation, a primitive form of expression on the physical side of the mental state of displeasure. The mental and the physical act having never been dissociated from each other, the suggestion is made that, in more subdued form, some such actions occur as the correlate of all states of displeasure. The particular form of expression of helplessness by the cry has been preserved together with its subjective correlate, pity, as a fundamental psycho-social situation.

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